中山科學研究院
電磁相容試驗室
Chung Shan Institute of Science & Technology
ElectroMagnetic Compatibility Laboratory

桃園龍潭郵政 90008 附 22 之 6 號信箱
P.O. Box No. 90008-22-6, Lung-Tan,
Tao-Yuan, 325, Taiwan, R.O.C.
TEL：886-3-4459715, 886-3-4459716
FAX：886-3-4716878

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EMC TEST REPORT FOR AMS-02 J/JPD

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1 SCOPE OF WORK

The AMS-02 J/JPD was tested according to the following documents:

Table 1. Description of Test Standards and Test Items

Test Standard		
SSP 30238 Revision D, 22 December 1998, "Space Station Electromagnetic Techniques", International Space Station SSP 30237 Revision F, 17 May 2001, "Space Station Electromagnetic Emission and Susceptibility Requirements", International Space Station		
Test Item	**Description**	**Test Specification**
CE01	**DC power leads, low frequency, 30 Hz to 15 kHz**	**See Figure 1**
CE03	**DC power leads, 15 kHz to 50 MHz**	**See Figure 3**
CE07	**DC power leads, spikes, time domain**	**See Figure 4**
CS01	**DC power leads, 30 Hz to 50 kHz**	**See Figure 6**
CS02	**DC power leads, 50 kHz to 50 MHz**	**See Table 4**
CS06	**Spikes, power Leads**	**See Figure 9**
RE02	**Electric field, 14 kHz to 20 GHz (narrowband)**	**See Figure 11**
RS02	**Magnetic induction field (CS06 spike generator)**	**See Figure 9**
RS03	**Electric field, 14 kHz to 20 GHz: 14kHz to 200 MHz at 5 V/m, 200 MHz to 8 GHz at 60 V/m, 8 GHz to 10 GHz at 20 V/m, 2.2 GHz at 161 V/m, 8.5 GHz at 79 V/m, 14.8 GHz to 15.2 GHz at 250 V/m**	**See Table 6**
LE01	**Power user leakage current (AC)**	**Not Applicable**

2 TEST LABORATORY

The EMC compliance tests were carried out at the EMC Laboratory of CSIST, Tao-Yuan, Taiwan, R.O.C..

3 TEST PERIOD

Test sample received: **10 September 2003**
Date of commencement: **10 September 2003**
Date of accomplishment: **16 September 2003**
Ambient conditions during test: **Temperature: 24~28℃, Relative Humidity: 55 ~ 70%**

4 EQUIPMENT UNDER TEST

4.1 Equipment submitted for tests

Overall designation of system/product:

Table 2. Description of **E**quipment **U**nder **T**est

Item	**Model**	**Manufacturer**	**Note**
The AMS-02	J/JPD		

Power supply: +28VDC
Hereafter the above will be referred to as **EUT** (**E**quipment **U**nder **T**est).

4.2 Modes of operation

All tests were carried out with the EUT in normal operation, which was defined as:

Table 3. Functional Operations of **EUT**

Item	Function	Note
Normal Operation Mode	**All communications** **Interface :Fiber or RS 422**	

4.3 Modifications during testing

No modification of the EUT was made during the compliance tests. The RS 422 cable was shielded with knitted metal tube during all tests. The power supply cables and the interconnecting cable were shielded with knitted metal tubes during the RS03 test.

5 EVALUATION OF PERFORMANCE DURING THE TEST

5.1 EMI Tests

5.1.1 EUT Operations Under EMI Tests

In order to verify correct performance of the EUT during the tests, the following functions were monitored: **Normal Operation Mode.**

5.1.2 Acceptance Criteria of EMI Tests

The emissions shall not be in excess of those limits shown in the specified EMI test items.

5.2 EMS Tests

5.2.1 EUT Performance monitoring Under EMS Tests

In order to verify correct performance of the EUT during the tests, the following functions were monitored: **Normal Operation Mode**.

5.2.2 Acceptance Criteria of EMS Tests

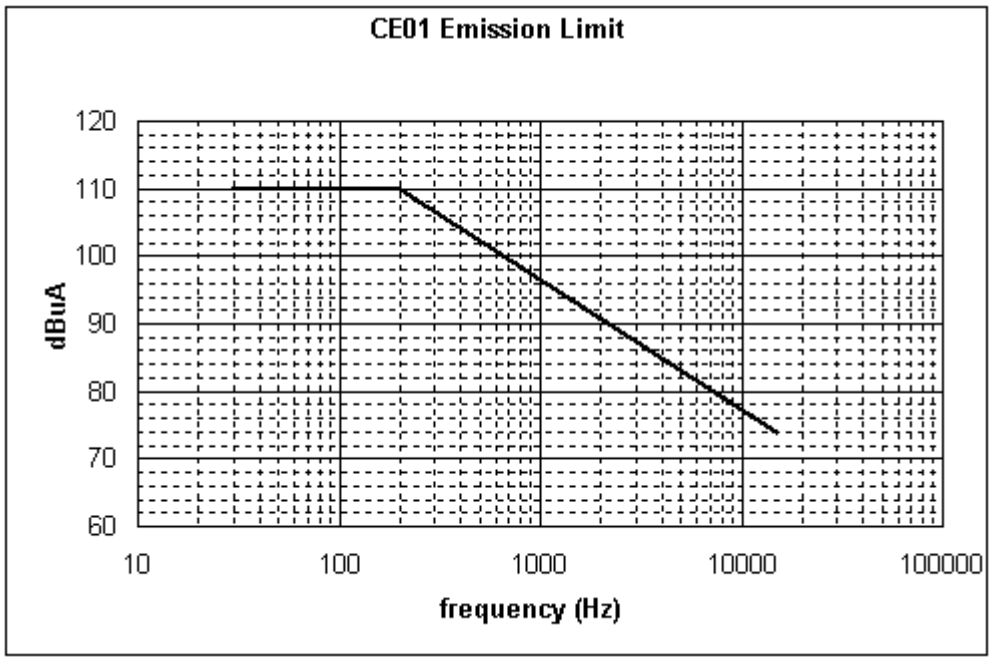
When subjected to the specified EMS test items, the EUT shall not exhibit any malfunction, degradation of performance, or deviation from specified indications, beyond the tolerances indicated in the individual equipment or subsystem specification..

6 EMC TESTS

6.1 CE01

6.1.1 Test specification

Conducted emissions on power leads shall not exceed the values shown on Figure 1.



Frequency	Emissions
30 Hz to 200 Hz	110 dBuA
200 Hz to 15 kHz	Decreasing log linearly with increasing frequency from 110 to 74 dBuA
* narrowband, NBW <= 100 Hz.	

Figure 1. CE01 Emission Limits

6.1.2 Test Set-up

Maintain a basic test setup for the EUT as shown in Figure 15 and Figure 16. Configure the measurement current probe and EUT as shown in Figure 2.

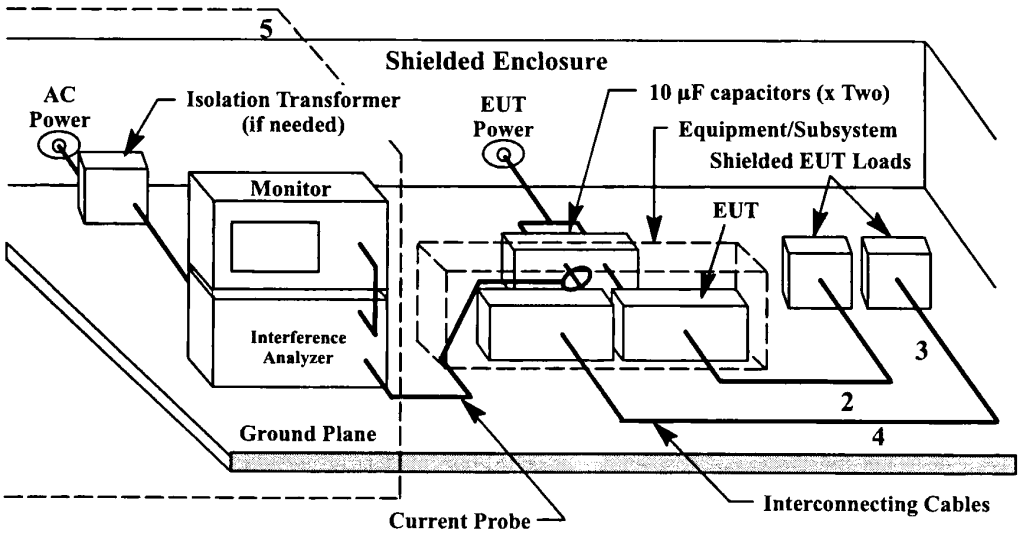


Figure 2. Typical Test Setup For Item CE01 & CE03

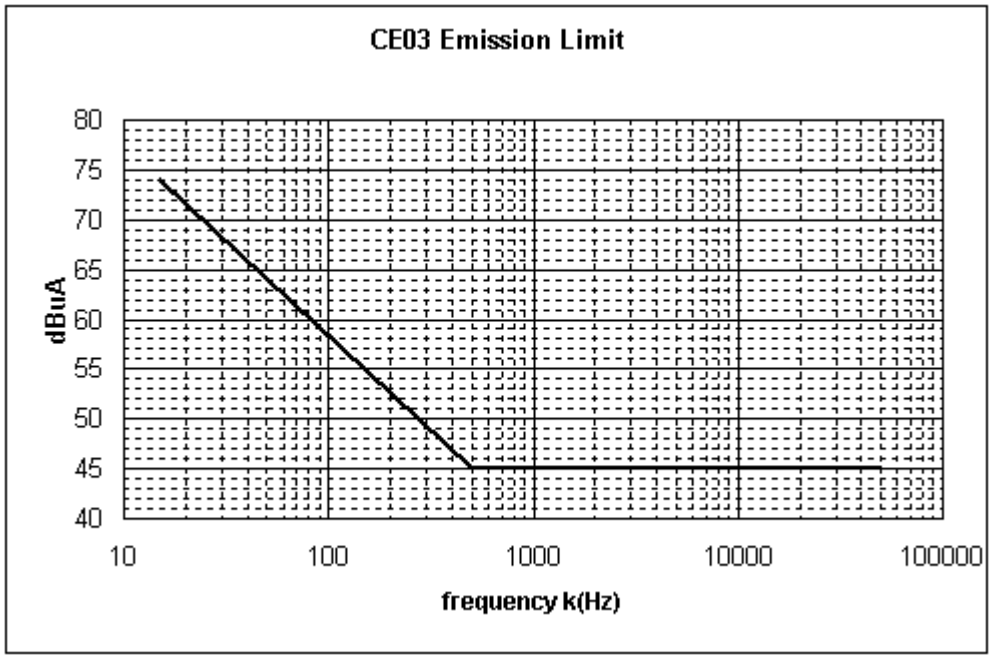
6.1.3 Test Procedures

(1) Turn on the EUT and allow sufficient time for stabilization.
(2) Select an appropriate lead for testing and clamp the current probe into position.
(3) Scan the measurement receiver over the applicable frequency range, using the bandwidths and minimum measurement times specified in Table 7
(4) Repeat (3) for each power lead.

6.2 CE03

6.2.1 Test specification

Conducted emissions on power leads shall not exceed the values shown on Figure 3.



Frequency	Emissions
15 kHz to 500 kHz	**Decreasing log linearly with increasing frequency from 74 to 45 dBuA**
500 kHz to 50 MHz	**45 dBuA**

Figure 3. CE03 Emission Limits

6.2.2 Test Set-up

Maintain a basic test setup for the EUT as shown in Figure 15 and Figure 16. Configure the measurement current probe and EUT as shown in Figure 2.

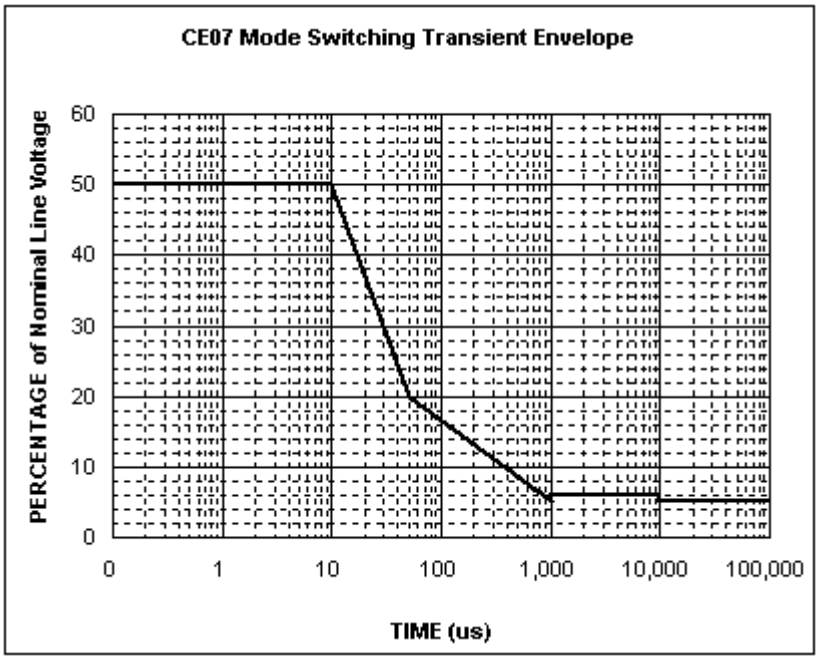
6.2.3 Test Procedures

(1) Turn on the EUT and allow sufficient time for stabilization.
(2) Select an appropriate lead for testing and clamp the current probe into position.
(3) Scan the measurement receiver over the applicable frequency range, using the bandwidths and minimum measurement times specified in Table 7
(4) Repeat (3) for each power lead.

6.3 CE07

6.3.1 Test specification

Conducted emissions on power leads shall not exceed the values shown on Figure 4.



Time (us)	Percentage of Nominal Line Voltage
0.1 – 10	+ 50%
10 – 50	Decreasing log linearly with increasing time from + 50 to + 20%
50 – 1000	Decreasing log linearly with increasing time from + 20 to + 5% or + 6 Volts(V), whichever is greater
1000 – 10,000	+ 6% or + 0.5 V, whichever is greater
10,000 – 100,000	+ 5% or + 0.5 V, whichever is greater

Figure 4. Mode Switching Transients Envelope

6.3.2 Test Set-up

(1) Maintain a basic test setup for the EUT as shown in Figure 15 and Figure 16.

6.3.3 Test Procedures

(1) Turn on the EUT and allow sufficient time for stabilization.

(2) The setup shall be as shown in Figure 5. The measurement shall be made line-to-line, with oscilloscope probes connected between each line to be measured and each of the two channels of the oscilloscope, with the second channel inverted and added to the first channel. The probes shall be attached to the energized line impedance stabilization network, with the switch to the EUT open. The measurement is closed. Prior to making a line to line

measurement as described above, it is necessary to match the gain of the two oscilloscope channels within some tolerance.

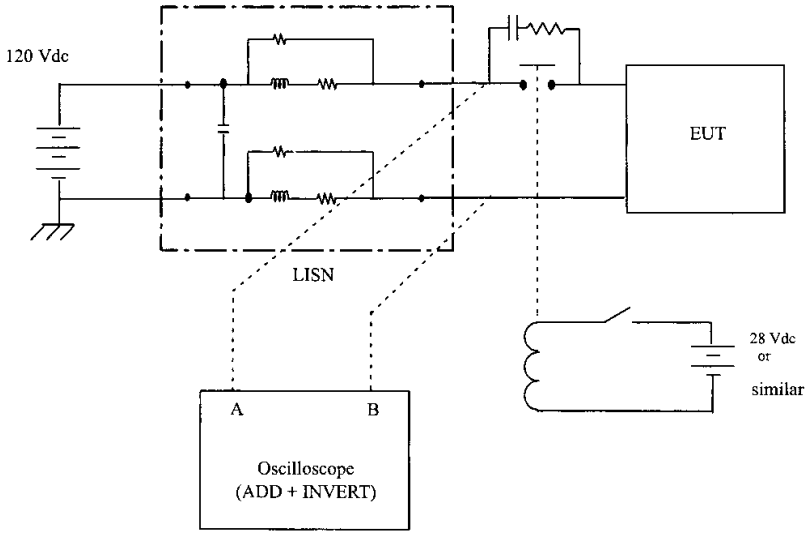


Figure 5. Typical Test Setup For Item CE07

(3) The tolerance required is what is necessary to reduce common mode "residues" to a level that will not affect results.
(4) With the setup of Figure 5, cycle the power to the EUT on/off and exercise all the appropriate internal EUT mode switches. Record the voltage transients. Compare against the appropriate transient specification.

6.4 CS01

6.4.1 Test specification

The EUT shall not exhibit any malfunction, degradation of performance, or deviation from specified indications beyond the tolerances indicated equipment or subsystem specification, when subjected to a test signal with voltage levels as specified in Figure 6.

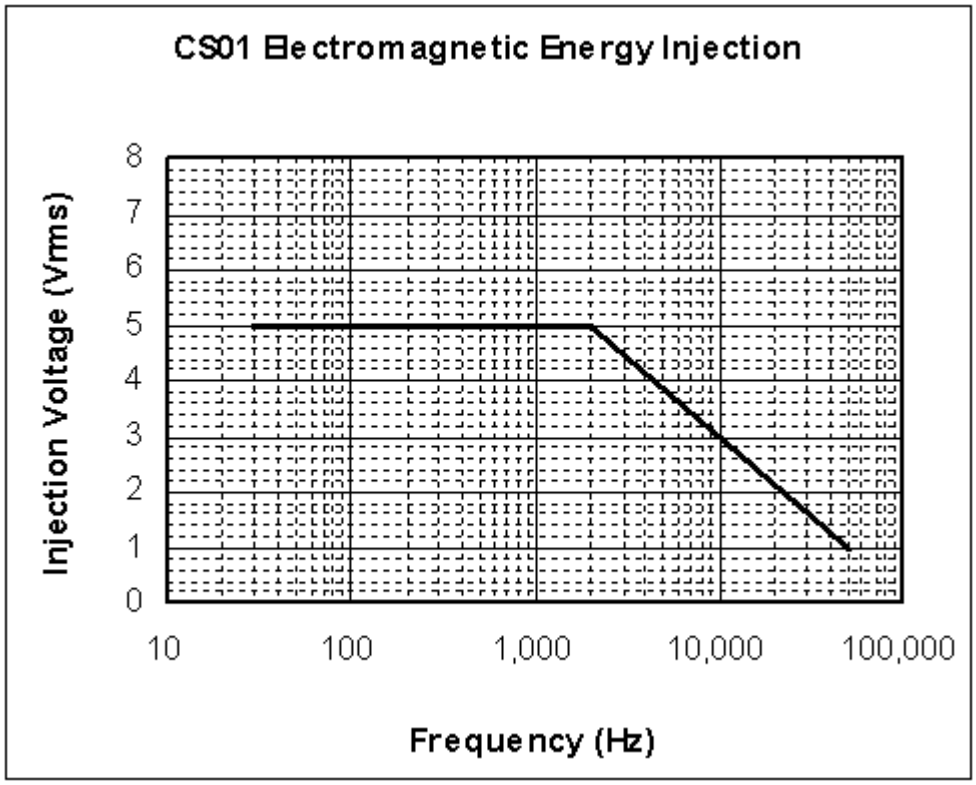
6.4.2 Test Set-up

Typical test setups are shown in Figure 15 and Figure 16.

The test setup shall as shown in Figure 7. Appropriate monitoring devices shall be connected to EUT outputs.

6.4.3 Test Procedures

(1) Turn on the EUT and allow sufficient time for stabilization.
(2) The signal generator shall be tuned through the required frequency range with the power amplifier output adjusted to the level specified. The equipment shall be monitored for: malfunction, degradation of performance, deviation of parameters beyond tolerances indicated in the equipment specification.



Frequency	Voltage
30 Hz – 2 kHz	5 Vrms or 10% of supply voltage (E1), whichever is less
2 kHz – 50 kHz	Decreasing log linearly with increasing frequency from 5 Vrms, or E1 whichever is less, to either 1 Vrms or 1 % of the supply voltage, whichever is less

Figure 6. CS01 Electromagnetic Energy Injection

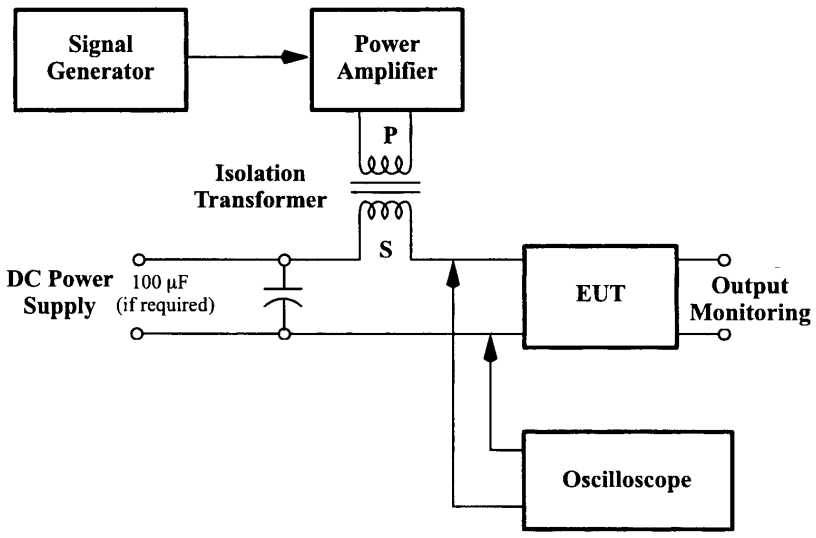


Figure 7. Typical Test Setup for CS01

6.5 CS02

6.5.1 Test specification

The EUT shall not exhibit any malfunction, degradation of performance, or deviation from specified indications beyond the tolerances indicated equipment or subsystem specification, when subjected to a test signal with voltage levels as specified in Table 4.

Table 4. CS02 Electromagnetic Energy Injection

Frequency	Voltage
50 kHz – 50 MHz	**1 Vrms** **The requirement is also met under the following condition: A 1 Watt source of 50 ohms impedance cannot develop the required voltage at the EUT power input terminals, and the EUT is not susceptible to the output of the signal source.**

6.5.2 Test Set-up

Typical test setups are shown in Figure 15 and Figure 16.

Test setup is shown in the following figure: Figure 8.

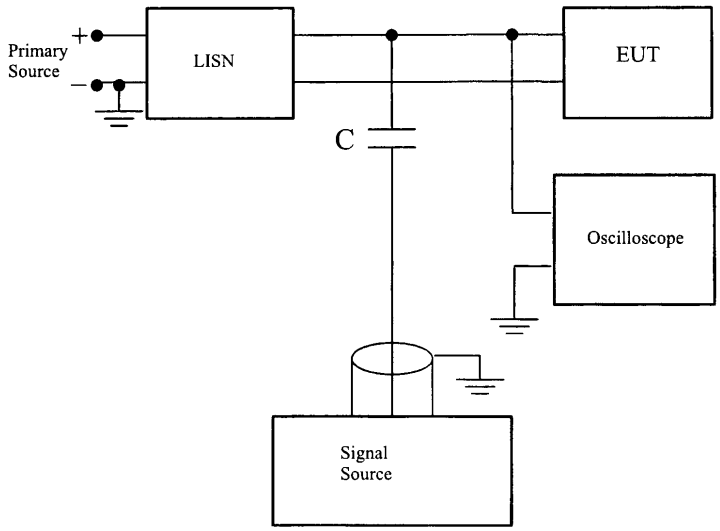


Figure 8. Typical Test Setup for CS02

6.5.3 Test Procedures

(1) Turn on the EUT and allow sufficient time for stabilization.

(2) The coupling capacitor and voltmeter, oscilloscope, or interference analyzer shall be connected within 30 cm of termination to the EUT. The test signal shall be applied to each power lead.
(3) When testing equipment using single point grounds (dc power input leads isolated within the EUT), the test signal shall be applied between each power lead or ground return lead and the ground plane. The voltage across the injection terminal to ground of the EUT shall be measured and recorded.
(4) If the EUT is susceptible to the applicable limit level, then the signal source output shall be decreased to determine and record the threshold of susceptibility.

6.6 CS06

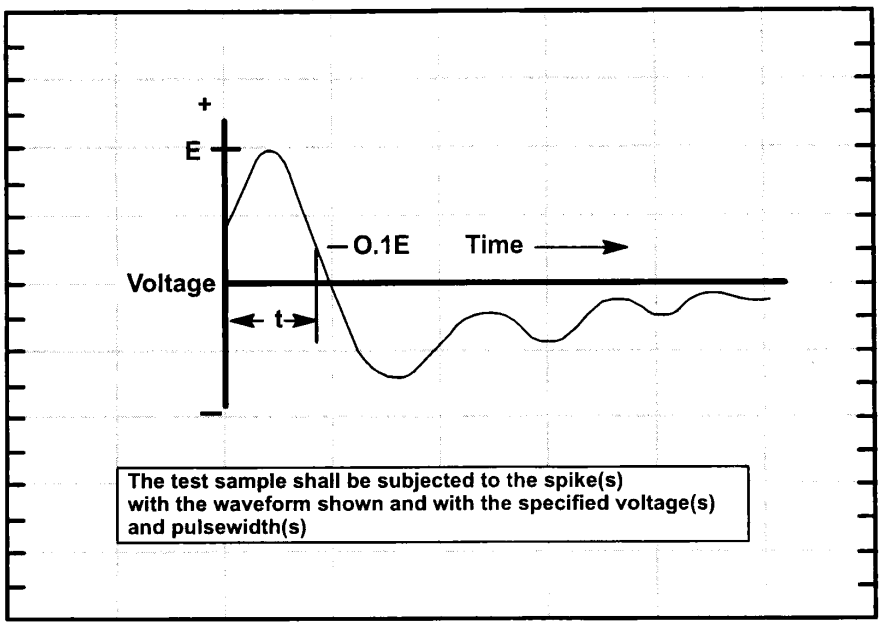
6.6.1 Test specification

The EUT shall not exhibit any malfunction, degradation of performance, or deviation from specified indications beyond the tolerances indicated equipment or subsystem specification, when subjected to a test signal with voltage levels as specified in Figure 9.

6.6.2 Test Set-up

Typical test setups are shown in Figure 15 and Figure 16.

Test setup is shown in the following figure: Figure 10.



SPIKE #1 E = ± Twice the nominal line voltage, t = 10 microseconds ± 20 percent

SPIKE #2 E = ± Twice the nominal line voltage, t = 0.15 microseconds ± 20 percent

Figure 9. CS06 and RS02 Equipment Limit

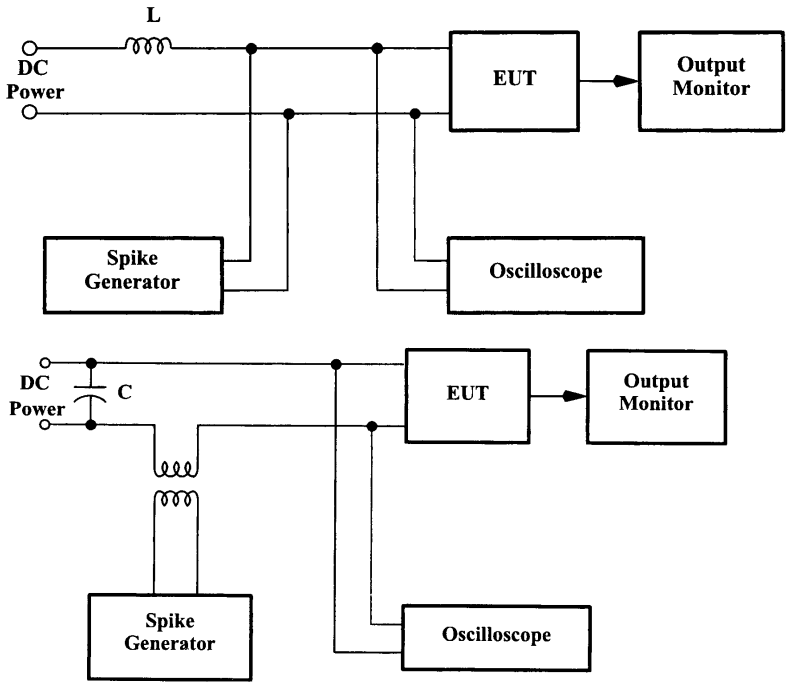


Figure 10. CS06 Test Setup

6.6.3 Test Procedures

Test procedures for testing equipment with leads shall be as follows:

(1) Turn on the EUT and allow sufficient time for stabilization.

(2) The EUT and test instrumentation shall be connected as shown in Figure 10. Either a series or shunt test method may be used.

(3) The applied spike amplitude, rise, time, and duration, as measured by the oscilloscope across the input terminals of the EUT, follow the typical wave shape and amplitude as specified. The applied spike shall be developed across a no inductive 5 ohm resistor and then applied to the EUT.

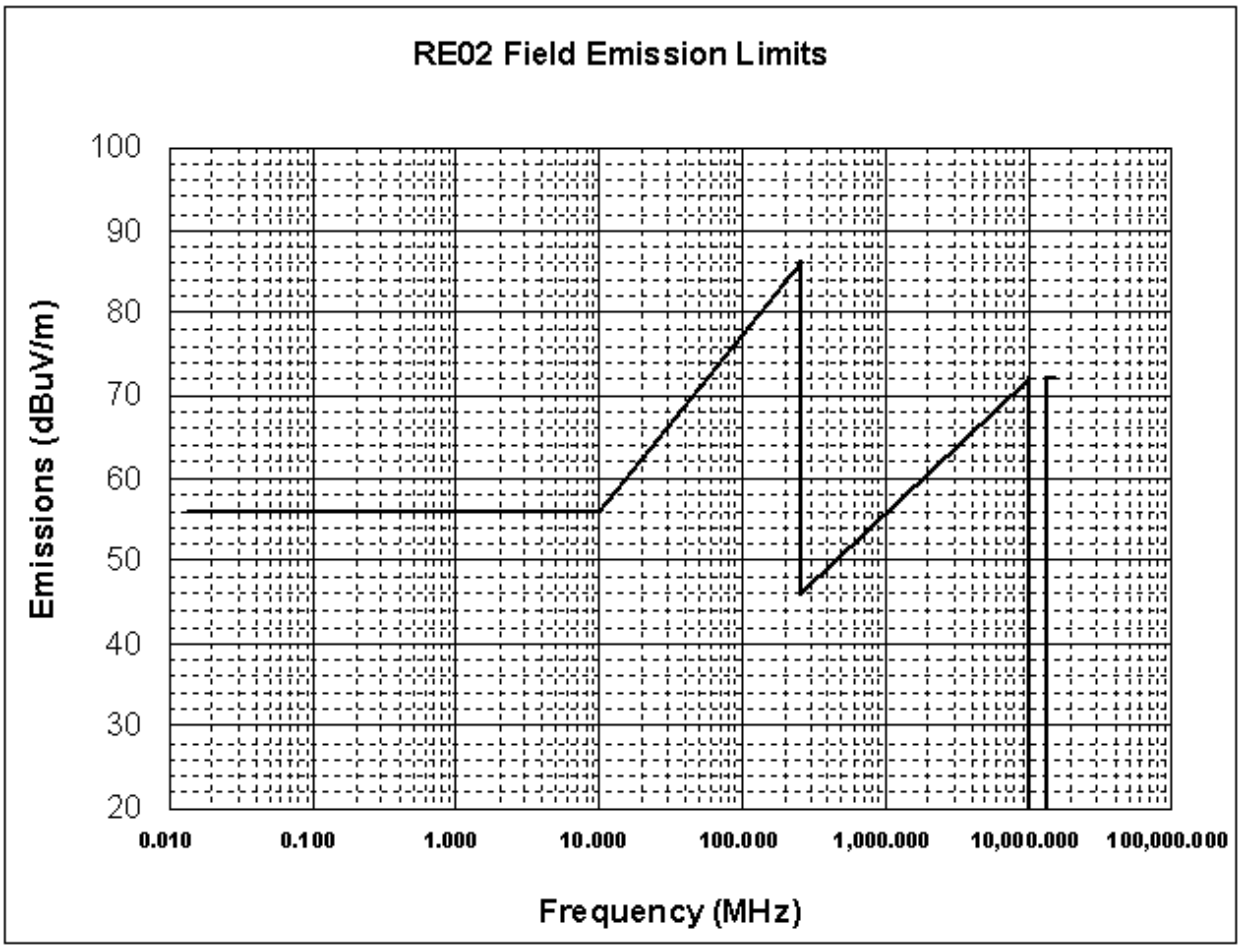
(4) Repetitive (6 to 10 pulses per second) spikes, both positive and negative, shall be applied to the EUT ungrounded input lines for a period not less 2 minutes in duration. On equipment employing gated circuitry, the spike shall be triggered to occur within the time frame of the gate.

(5) If susceptibility occurs, then its threshold level, repetition rate, and time of occurrence on circuit gates shall be determined and recorded.

6.7 RE02

6.7.1 Test specification

Electric field emissions shall not be radiated in excess of those shown in Figure 11. Above 30 MHz, the limits shall be met for both horizontally and vertically polarized fields.



Frequency	Emissions
14 kHz – 10 MHz	56 dBuV/m
10 MHz – 259 MHz	Increasing log linearly with increasing frequency from 56 to 86 dBuV/m (16 dB per decade)
259 MHz – 10 GHz	Increasing log linearly with increasing frequency from 46 to 72 dBuV/m (16 dB per decade)
13.5 GHz – 15.5 GHz	72 dBuV/m

Figure 11. RE02 Field Emission Limits (Narrowband)

6.7.2 Test Set-up

Maintain a basic test setup for the EUT as shown in Figure 15 and Figure 16. Configure the measurement equipment and EUT as shown in Figure 12.

6.7.3 Test Procedures

(1) Turn on the EUT and allow sufficient time for stabilization.
(2) EUT antenna terminals, if any, shall be connected to shielded dummy loads.
(3) Nonportable equipments is permanently connected either physically or electrically to a vehicle, system, or installation. It shall be tested in accordance with the setup shown in Figure 12.
(4) LOCATE MAXIMUM RADIATION: The EUT shall be probed to locate the points of maximum radiation from the EUT.

(5) The test antennas shall be selected and positioned as shown in Figure 12 at a test distance of 1 meter. In the frequency rang of 30 MHz to 20GHz, linearly polarized antennas shall be positioned so as to make both vertical and horizontal measurements. If a rod antenna with a counterpoise is used, then the counterpoise of a 41-inch rod antenna shall be bonded in accordance with the requirements.

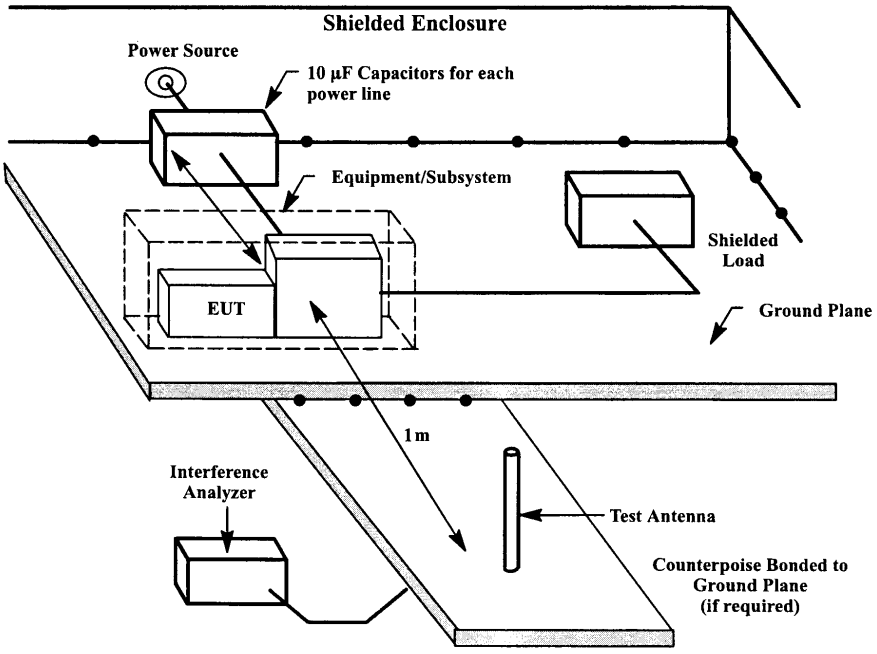


Figure 12. Typical Test Setup For Item RE02

6.8 RS02

6.8.1 Test specification

The EUT shall not exhibit any malfunction, degradation of performance, or deviation from specified indications, beyond the tolerances indicated in the individual equipment or subsystem specification, when subjected to the magnetic fields shown in Table 5.

Table 5. RS02 Limits

SPIKE #1	**E = ±Twice the nominal line voltage, t = 10 us ± 20%**
SPIKE #2	**E = ±Twice the nominal line voltage, t = 0.15 us ± 20%**
*** The waveform is the same as that specified for CS06 test.**	

6.8.2 Test Set-up

Maintain a basic test setup for the EUT as shown in Figure 15 and Figure 16.

Configure the test as shown in Figure 13.

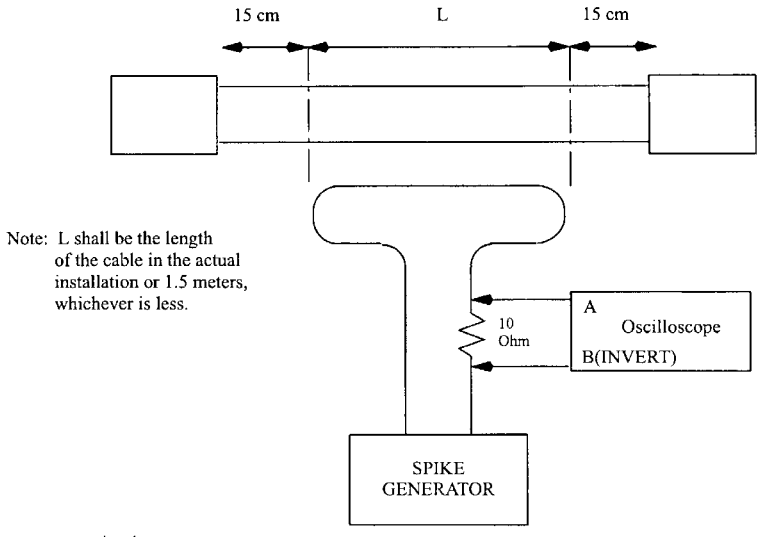


Figure 13. Test Setup for RS02

6.8.3 Test Procedures

(1) Turn on the measurement equipment and allow sufficient time for stabilization. Turn on the EUT and allow sufficient time for stabilization.

(2) The cable under test (CUT) shall be stressed by taping an insulated AWG#12(or larger) size wire (coupling wire) to each CUT in the test setup, parallel to the CUT, running the entire length of the bundle to 15 cm from each end connector. The portions of the test wire not taped to the CUT shall be well removed from the CUT in order to couple the maximum flux into the CUT. In some cases where it is known that the Space Station installed cable will be significantly longer than the CUT, it may be desired to simulate stressing of the installed length by multiple parallel wraps of the test wire such that the meter turns product of the test wire taped to the CUT is numerically equal to the length (in meters) of the installed cable. In such cases, it is important that the portions of the test wire not adjacent to the CUT be not only removed from the vicinity of the CUT, but also that each layer of the wrap be removed from adjacent layers to limit inductance which can cause an inability to provide sufficient current to perform the test. For the same reason, it is important to have a controlled test wire configuration so that the calibrated current is unchanged for the duration of the test.

(3) Two spike signals, both positive and negative, shall be impressed at a rate of 400 Hz or at the maximum rate at which the waveforms and amplitudes specified in SSP 30237 can be achieved. The waveforms and amplitudes of the spike signals shall be measured across a no inductive 10 ohm resistor. The measurement device shall be an oscilloscope, configured to read differentially across the resistor. That is, two probes shall be used to connect at the resistor terminals, and one channel's input shall be subtracted from the other (oscilloscope in ADD and INVERT modes).

6.9 RS03

6.9.1 Test specification

The EUT shall not exhibit any malfunction, degradation of performance, or deviation from specified indications, beyond the tolerances indicated in the individual equipment or subsystem specification, when subjected to the radiated electric fields listed in Table 6 and modulated as specified below. Up to 30 MHz, the requirement shall be met for vertically polarized fields. Above 30 MHz, the requirement shall be met for both horizontally and vertically polarized fields.

Table 6. RS03 Limit Level

Frequency/Range	Radiated Electric Field Level
14 kHz – 10 MHz	5 V/m
200 MHz – 8 GHz	60 V/m
8 GHz – 10 GHz	50 V/m
2.2 GHz	161 V/m
8.5 GHz	79 V/m
13.7 GHz – 15.2 GHz	250 V/m

6.9.2 Test Set-up

Maintain a basic test setup for the EUT as shown in Figure 15 and Figure 16. Configure the test as shown in Figure 14.

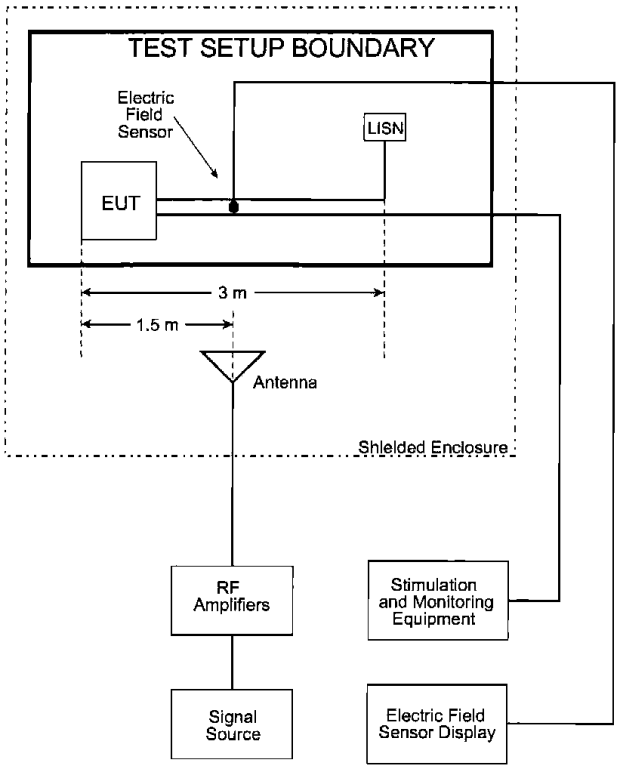


Figure 14. Test Setup for Radiated Electric Field Susceptibility

6.9.3 Test Procedures

(1) Turn on the measurement equipment and allow sufficient time for stabilization. Turn on the EUT and allow sufficient time for stabilization.
(2) PLACEMENT OF ANTENNAS: The test setup shall be as required by the general testing requirements for placement of antennas.
(3) TEST SIGNALS: Test signals shall consist of two categories are based on standard test frequencies and frequencies at amplitudes that are defined by the space station design.
(4) TEST SIGNAL LEVELS: The test signal levels shall be specified in SSP 30237. The test signal be established at the mounting location of the EUT. The field strengths shall be verified as required. Standard test frequencies shall as shown in Table 6.
(5) SIGANL MODULATION: Signal modulation for station derived frequencies shall be defined by the tier 1 contractor and both the type of modulation and percentage of modulation, if applicable, shall be documented. The tier 1 contractor shall also define the signal modulation characteristics for the standard test frequencies. The minimum criteria for the signal modulation of the standard test frequencies shall be as defined in this document.
(6) ANTENNA SELECTION: Fields shall be generated, as required, with signal sources and antenna that provide the required field strength. Long wire antennas or parallel strip line antennas may be used if they are applicable and desired.
(7) FIELD STRENGTH CALIBRATION: The specified field strength shall be established prior to the actual testing by placing a field measuring antenna at the same distance and in the same relation as the EUT and by adjusting the signal level applied to the transmitting antenna until the required field intensity is indicated, The voltage or power at the input terminals of the transmitting antenna required to establish the specified filed shall be monitored and recorded. When performing this calibration in a shielded enclosure, the measurement antenna shall be placed in either the exact location that the EUT will occupy or shall be in a position which simulates exactly the geometry of the EUT location with respect to distances to reflective surfaces. This calibration may be used for all subsequent testing provided that either the data were taken in a reflective free area or the same shield enclosure EUT location was used.
(8) The signal generators shall be tuned through the required frequency ranges with the power output adjusted to provide the fields specified. The equipment shall be monitored for evidences of susceptibility: Malfunction, Degradation of performance, Deviation of parameters beyond tolerances indicated in the EUT specification at frequencies where susceptibility is encountered, the threshold of susceptibility shall be determined. All pertinent data shall be recorded.
(9) MINIMUM CRITERIA FOR SIGNAL MODULATION: DIGITAL EQUIPMENT: Use pulse modulation with pulse duration and repetition rates equal to that used in the equipment.

6.10 LE01

NOT APPLICABLE.

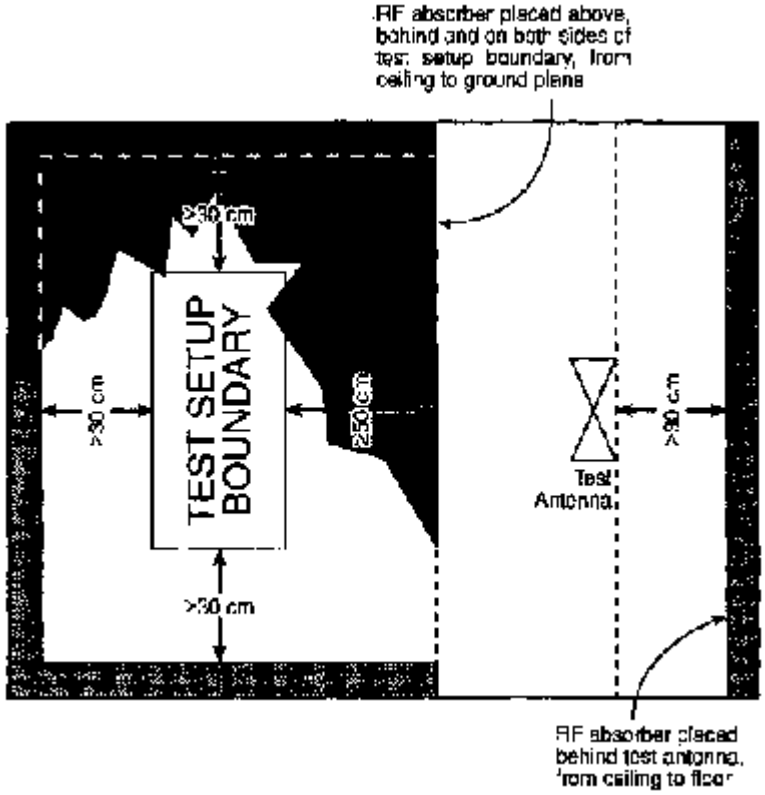


Figure 15. Typical Test Setup in RF Absorber Loading Chamber

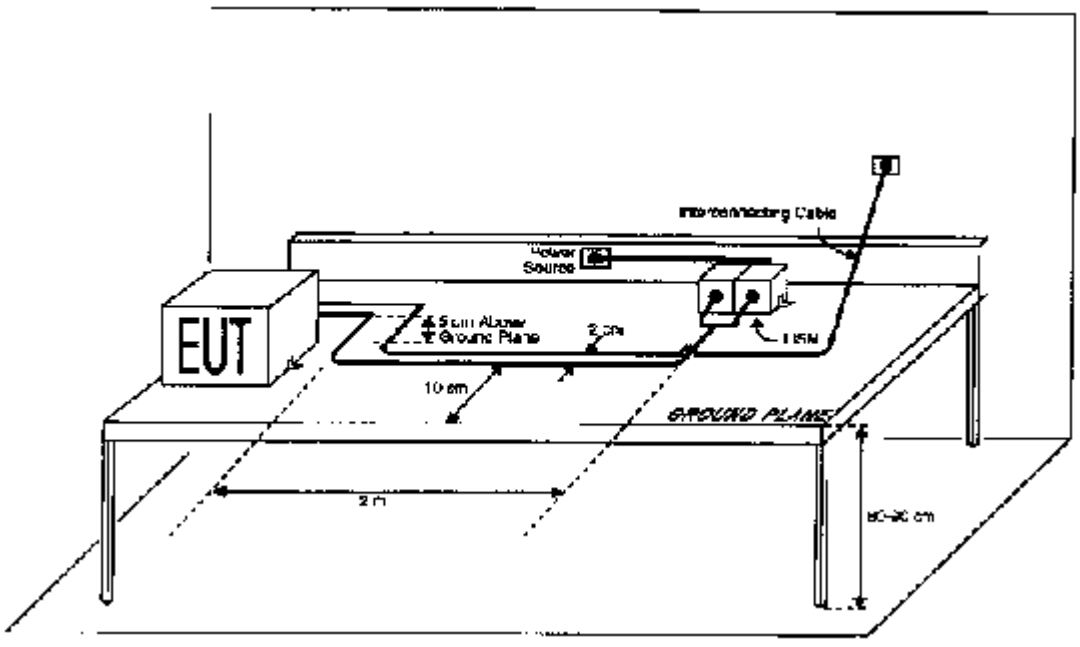


Figure 16. General Test Setup

Table 7. Bandwidth and Measurement Time

Frequency Range	6 dB Bandwidth	Dwell Time	Minimum Measurement Time Analog Measurement Receiver
30 Hz – 1 kHz	10 Hz	0.15 sec	0.015 sec/Hz
1 kHz – 10 kHz	100 Hz	0.015 sec	0.15 sec/kHz
10 kHz – 150 kHz	1 kHz	0.015 sec	0.015 sec/kHz
150 kHz – 30 MHz	10 kHz	0.015 sec	1.5 sec/MHz
30 MHz – 1 GHz	100 kHz	0.015 sec	0.15 sec/MHz
Above 1 GHz	1 MHz	0.015 sec	15 sec/GHz

Table 8. Susceptibility Scan Rate

Frequency Range	Analog Scans Maximum Scan Rates	Stepped Scans Maximum Step Size
30 Hz – 1 MHz	0.0333 f_0/sec	0.05 f_0
1 MHz –30 MHz	0.00667 f_0/sec	0.01 f_0
30 MHz – 1 GHz	0.00333 f_0/sec	0.05 f_0
1 GHz – 8 GHz	0.000667 f_0/sec	0.001 f_0
8 GHz – 40 GHz	0.000333 f_0/sec	0.0005 f_0

7 SUMMARY OF TEST RESULTS

The AMS-02 J/JPD was tested according to the following specifications and the EUT passed some of the EMC test items.

Table 9. Summary of Test Result

Test Standard			
SSP 30238 Revision D, 22 December 1998, "Space Station Electromagnetic Techniques", International Space Station SSP 30237 Revision F, 17 May 2001, "Space Station Electromagnetic Emission and Susceptibility Requirements", International Space Station			
Test Item	**Description**	**Test Specification**	**Test Result**
CE01	DC power leads, low frequency, 30 Hz to 15 kHz	See Figure 1	PASS
CE03	DC power leads, 15 kHz to 50 MHz	See Figure 3	PASS
CE07	DC power leads, spikes, time domain	See Figure 4	Not Applicable for 28 Vdc
CS01	DC power leads, 30 Hz to 50 kHz	See Figure 6	PASS
CS02	DC power leads, 50 kHz to 50 MHz	See Table 4	PASS
CS06	Spikes, power Leads	See Figure 9	PASS
RE02	Electric field, 14 kHz to 20 GHz (narrowband)	See Figure 11	FAIL
RS02	Magnetic induction field (CS06 spike generator)	See Figure 9	PASS
RS03	Electric field, 14 kHz to 20 GHz: 14kHz to 200 MHz at 5 V/m, 200 MHz to 8 GHz at 60 V/m, 8 GHz to 10 GHz at 20 V/m, 2.2 GHz at 161 V/m, 8.5 GHz at 79 V/m, 14.8 GHz to 15.2 GHz at 250 V/m	See Table 6	Pass
LE01	Power user leakage current (AC)	Not Applicable	Not Applicable

8 ATTACHMENT

8.1 Photos of Test Setup

Figure 17. CE01 Test Setup (1)

Figure 18. CE01 Test Setup (2)

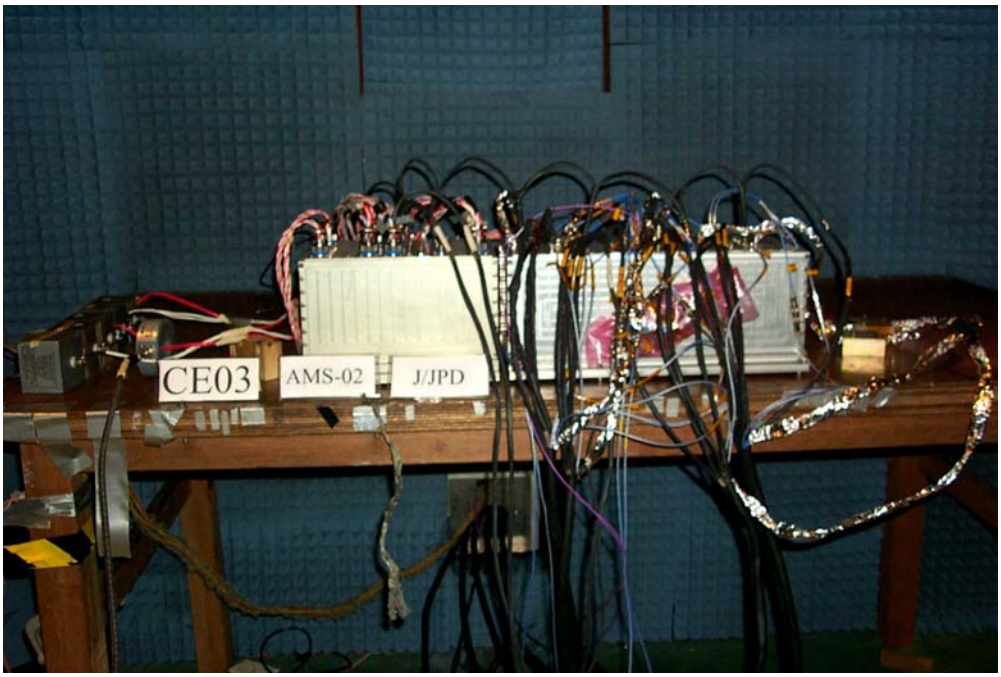


Figure 19. CE03 Test Setup (1)

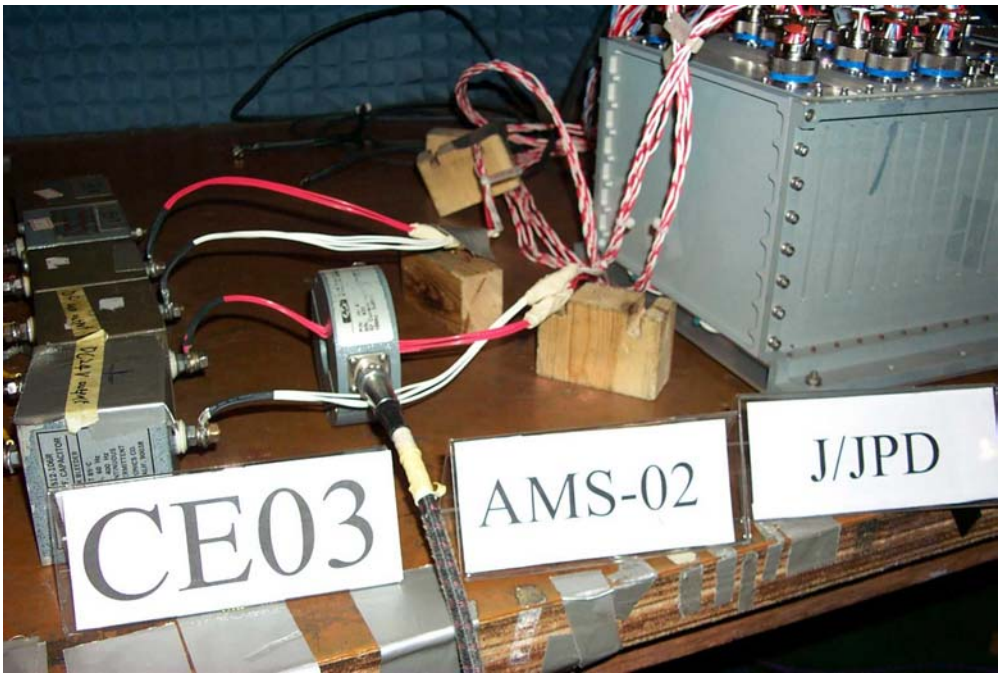


Figure 20. CE03 Test Setup (2)

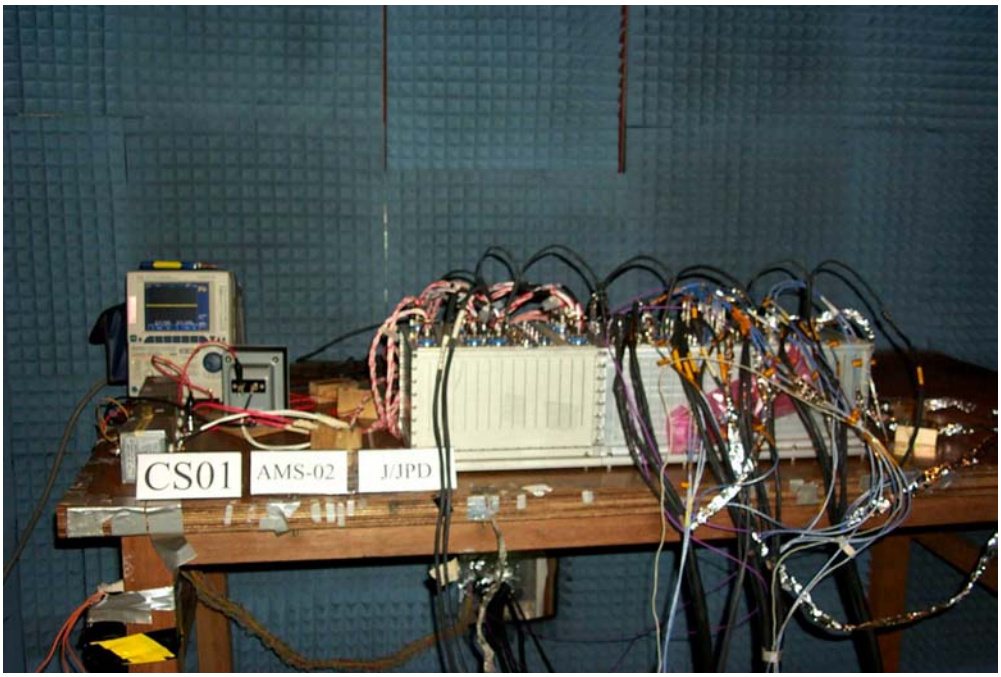


Figure 21. CS01 Test Setup

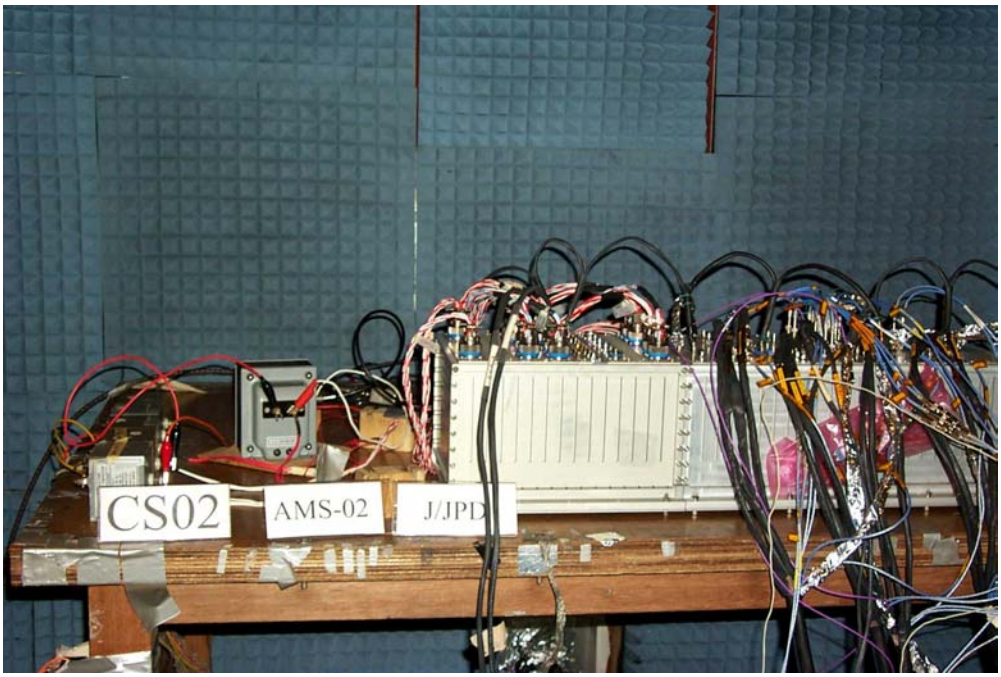


Figure 22. CS02 Test Setup

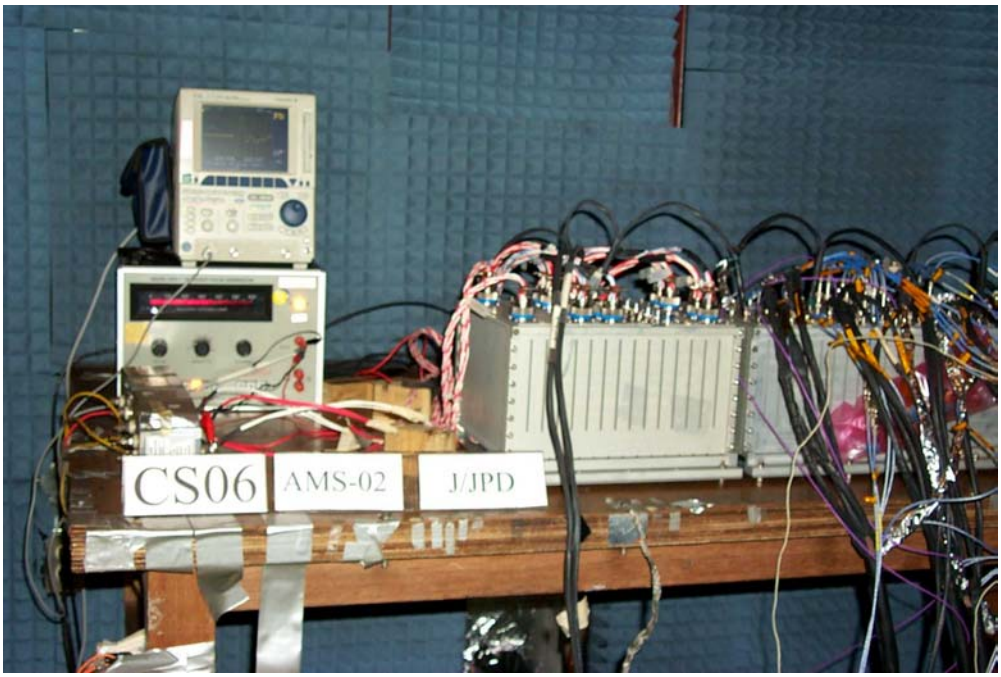


Figure 23. CS06 Test Setup

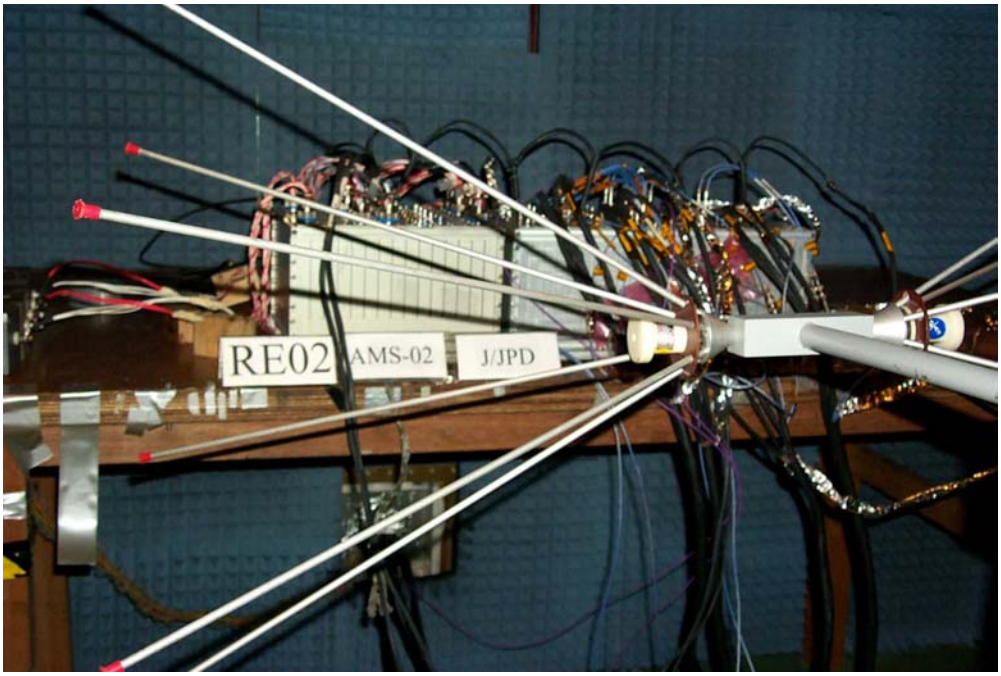


Figure 24. RE02 Test Setup

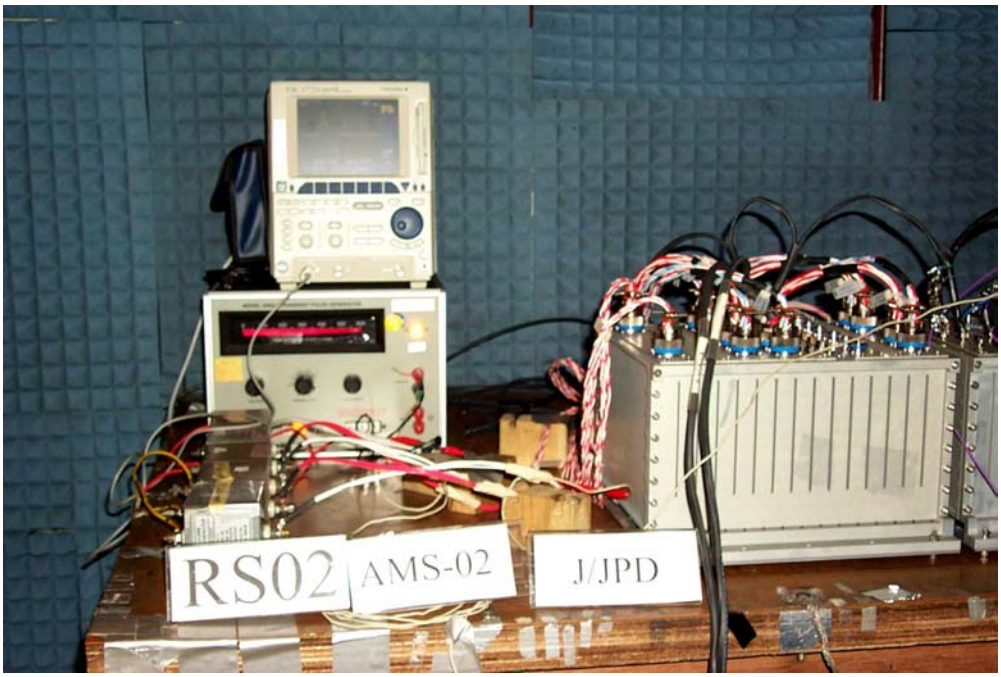


Figure 25. RS02 Test Setup

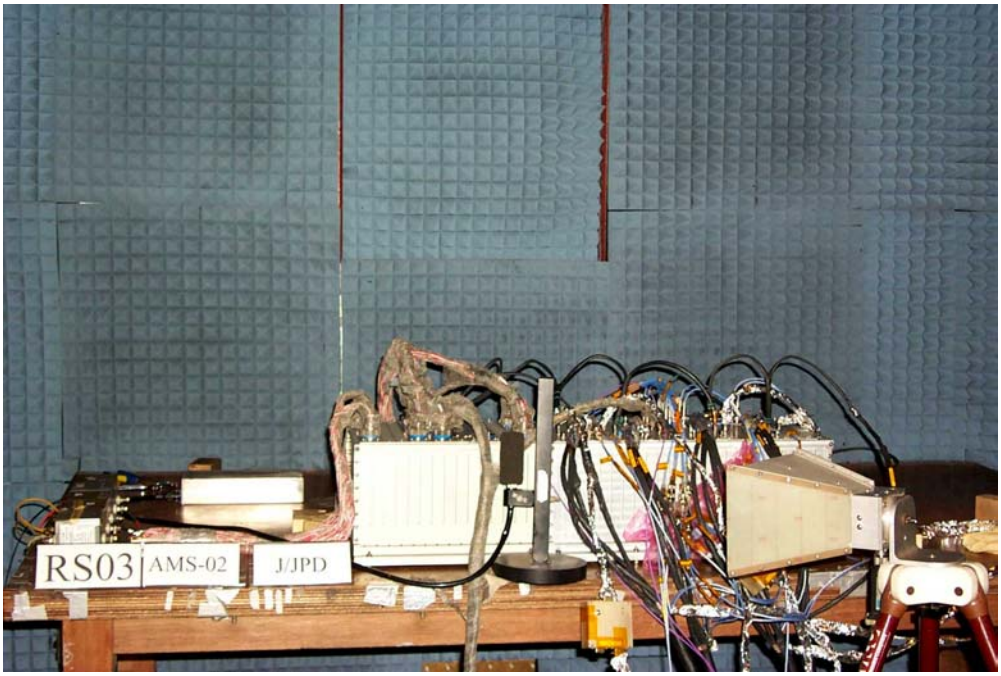
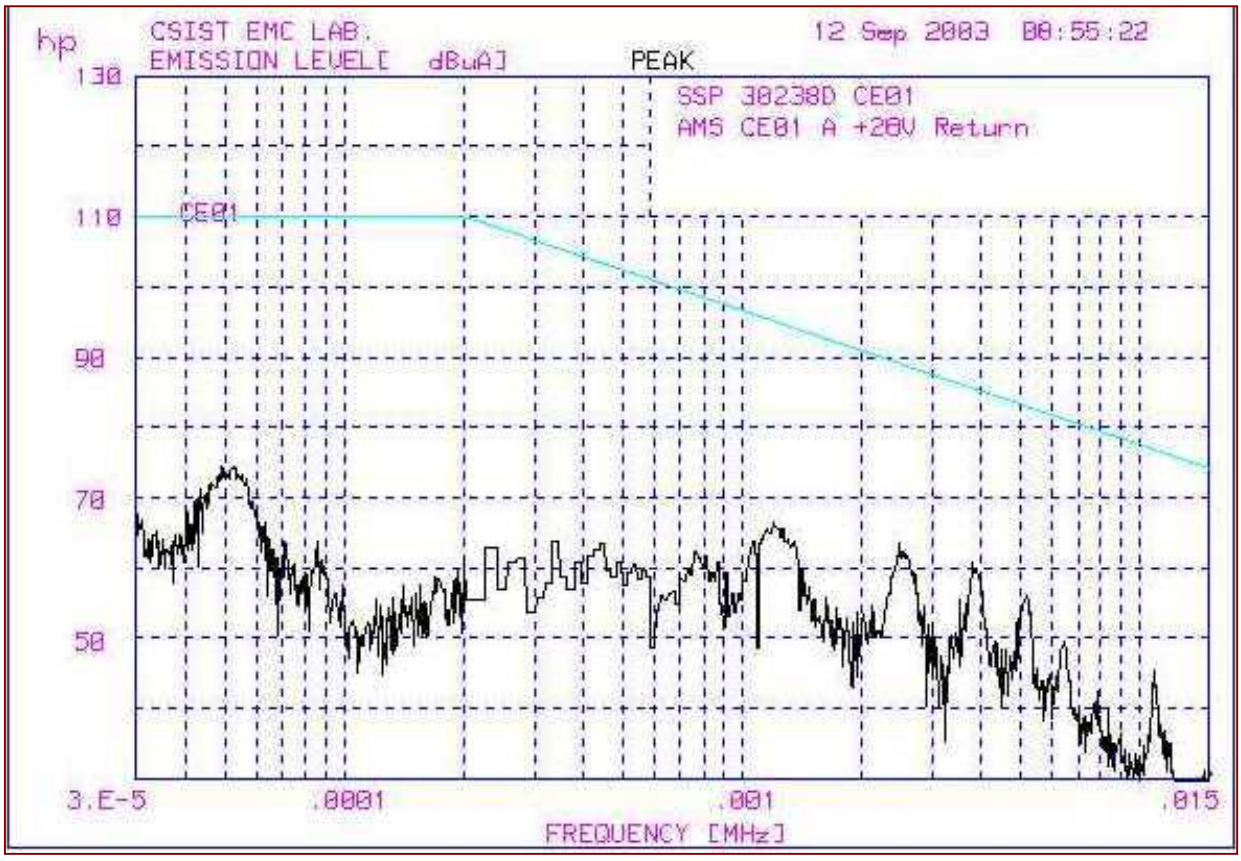


Figure 26. RS03 Test Setup

8.2 Test data

8.2.1 CE01 Test Data



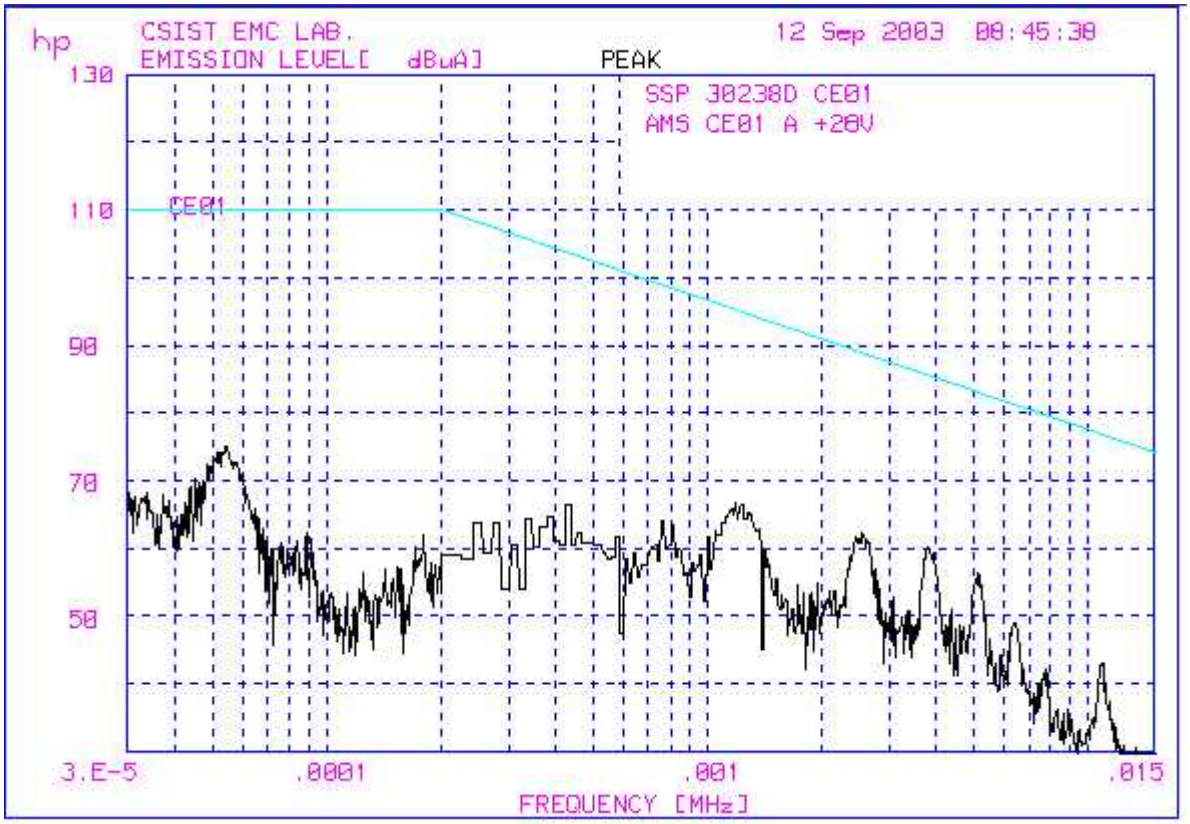
12 Sep 2003 08:55:22

01. AMS SSP 30237F, 30238D
01.01 SSP 30238D CE01

6 highest Peaks above -80 dB of Limit Line #1

PEAK#	FREQ (MHz)	(dBuA)	DELTA
1	.003804	60.8	-24.6
2	.002494	63.4	-25.5
3	.005188	55.9	-26.9
4	.001199	66.3	-28.7
5	.003531	55.4	-30.6
6	.01079	45.4	-31.3

Figure 27. AMS CE01 A +28V Return spectrum



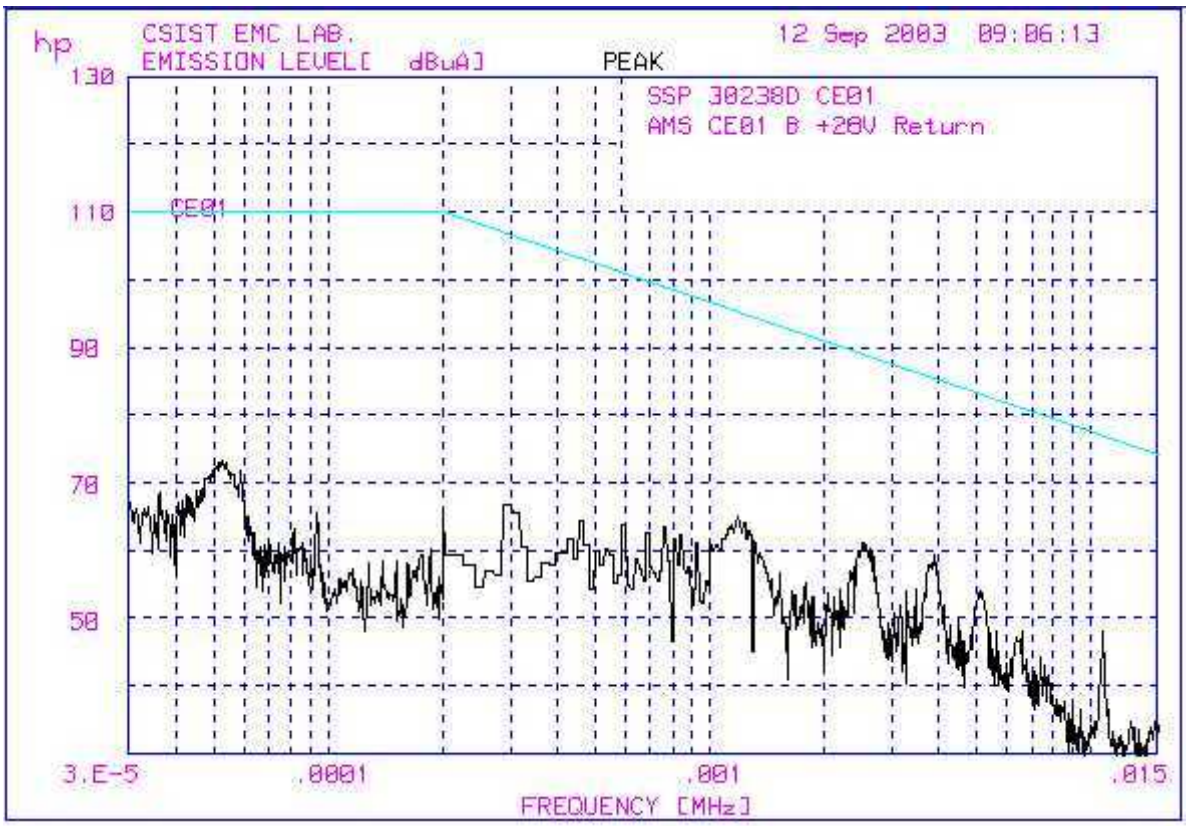
12 Sep 2003 08:45:38

01. AMS SSP 30237F, 30238D
01.01 SSP 30238D CE01

6 highest Peaks above -80 dB of Limit Line #1

PEAK#	FREQ (MHz)	(dBuA)	DELTA
1	.003804	60.1	-25.3
2	.002525	62.3	-26.5
3	.005124	56.3	-26.6
4	.001184	66.8	-28.3
5	.006368	48.8	-32.3
6	.004388	51	-33.2

Figure 28. AMS CE01 A +28V spectrum



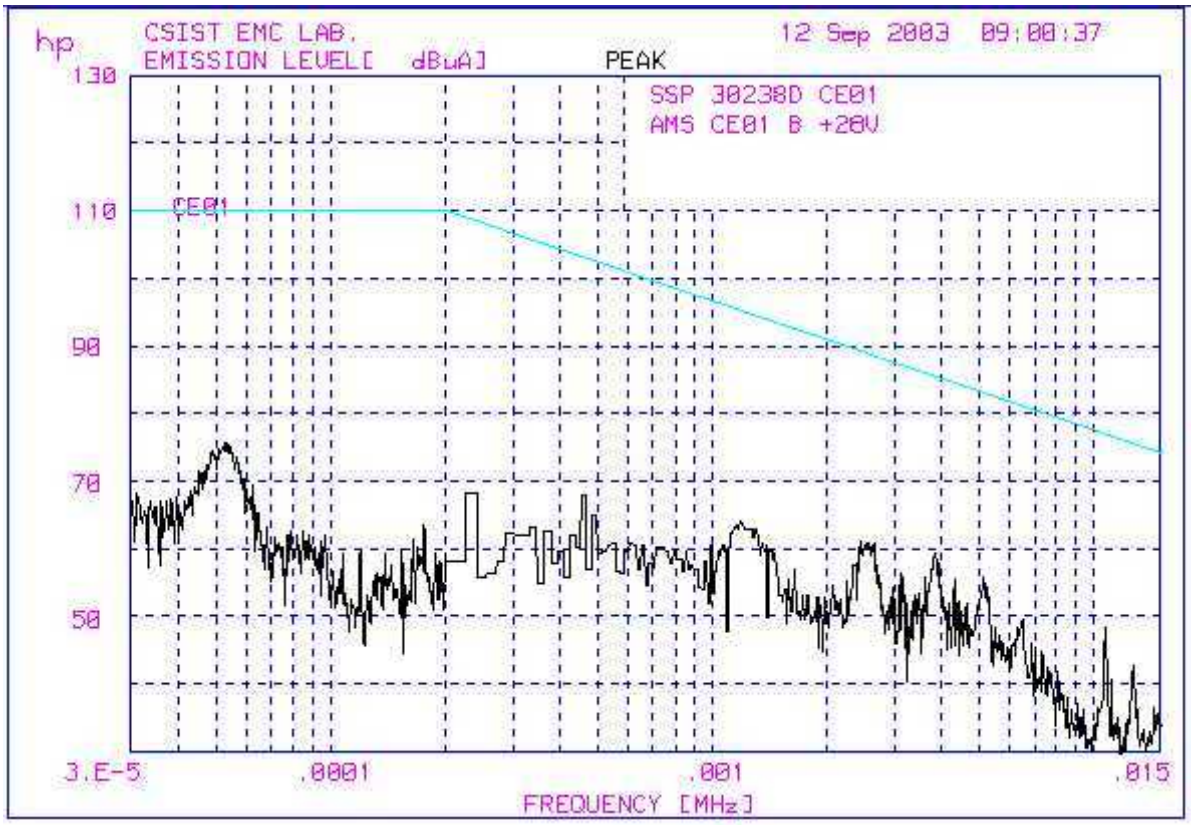
12 Sep 2003 09:06:13

01. AMS SSP 30237F, 30238D
01.01 SSP 30238D CE01

6 highest Peaks above -80 dB of Limit Line #1

PEAK#	FREQ (MHz)	(dBuA)	DELTA
1	.003899	59.3	-25.9
2	.002509	61.2	-27.7
3	.01073	48	-28.7
4	.005093	54.1	-28.9
5	.001184	64.8	-30.3
6	.002388	57.5	-31.8

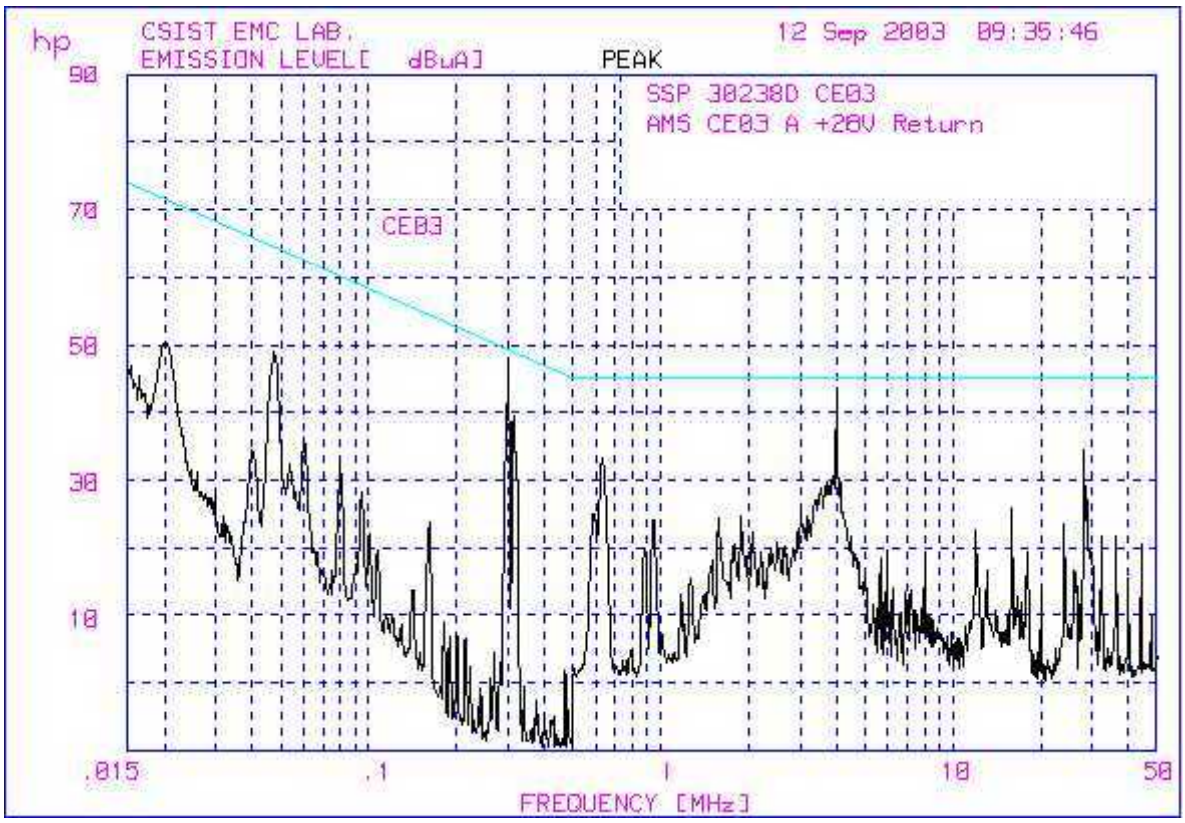
Figure 29. AMS CE01 B +28V Return spectrum



12 Sep 2003 09:00:37			
01. AMS SSP 30237F, 30238D			
01.01 SSP 30238D CE01			
6 highest Peaks above -80 dB of Limit Line #1			
PEAK#	FREQ (MHz)	(dBuA)	DELTA
1	.003851	59.3	-26.8
2	.005124	55.6	-27.3
3	.002448	61	-28.1
4	.01066	48.2	-28.6
5	.004333	55.4	-28.9
6	.00428	54.1	-30.3

Figure 30. AMS CE01 B +28V spectrum

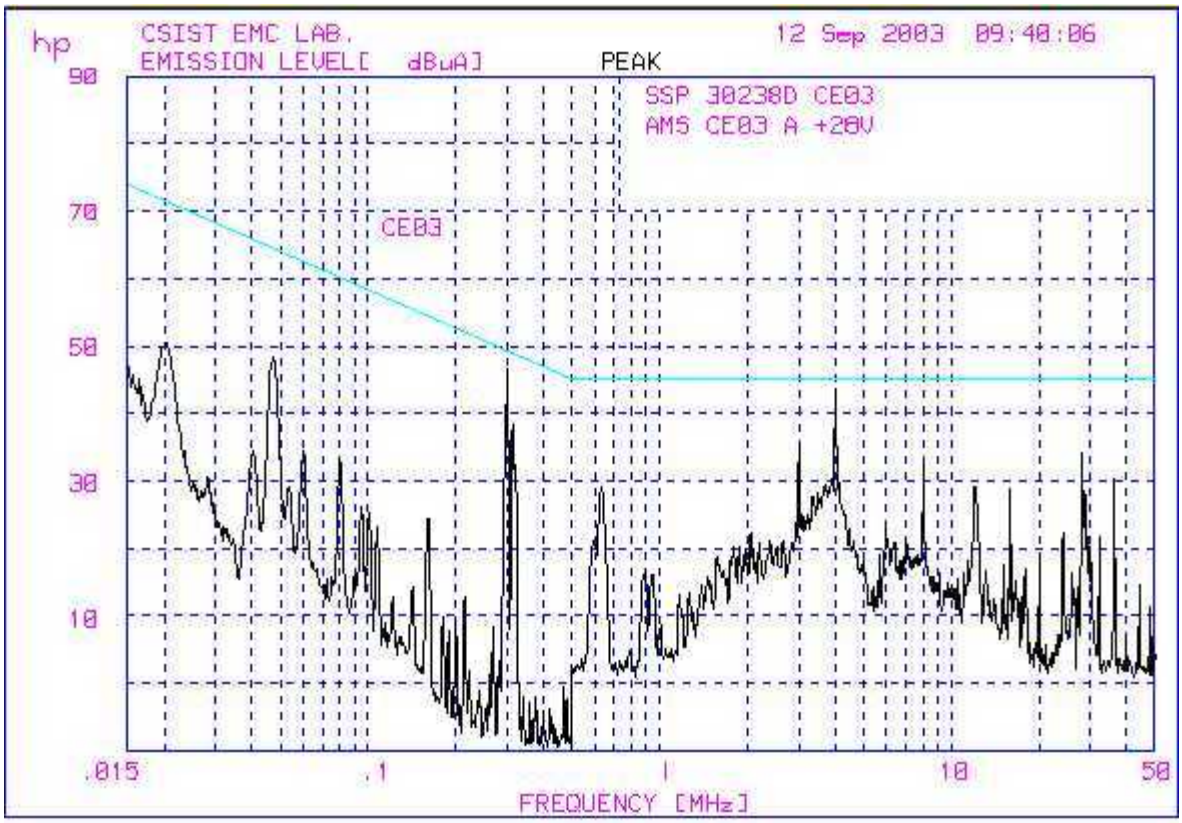
8.2.2 CE03 Test Data



12 Sep 2003 09:35:46
01. AMS SSP 30237F, 30238D
01.02 SSP 30238D CE03
6 highest Peaks above -80 dB of Limit Line #1

PEAK#	FREQ (MHz)	(dBuA)	DELTA
1	3.99	43.5	-1.5
2	.2984	47.4	-1.8
3	.3132	39.6	-9.2
4	28.13	34.3	-10.7
5	.6288	33.2	-11.8
6	.04741	49	-15.4

Figure 31. AMS CE03 A +28V Return spectrum

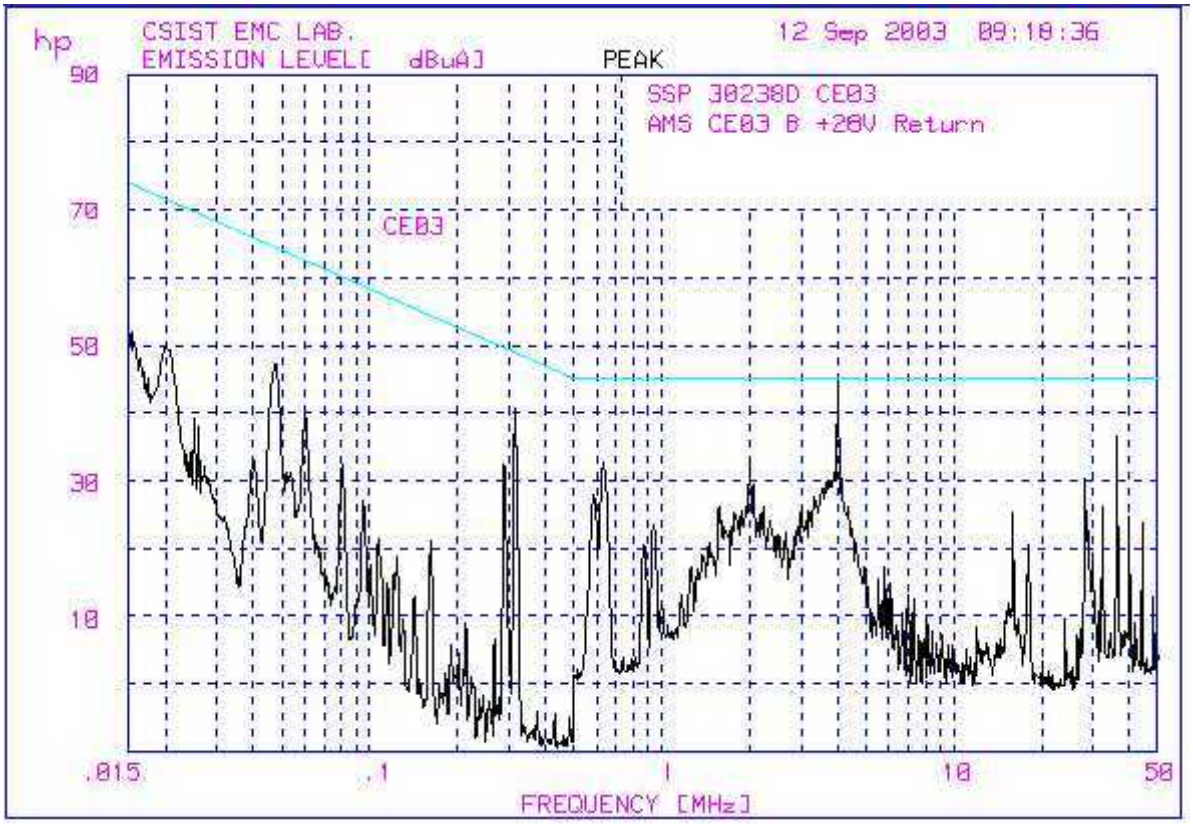


12 Sep 2003 09:40:06
01. AMS SSP 30237F, 30238D
01.02 SSP 30238D CE03

6 highest Peaks above -80 dB of Limit Line #1

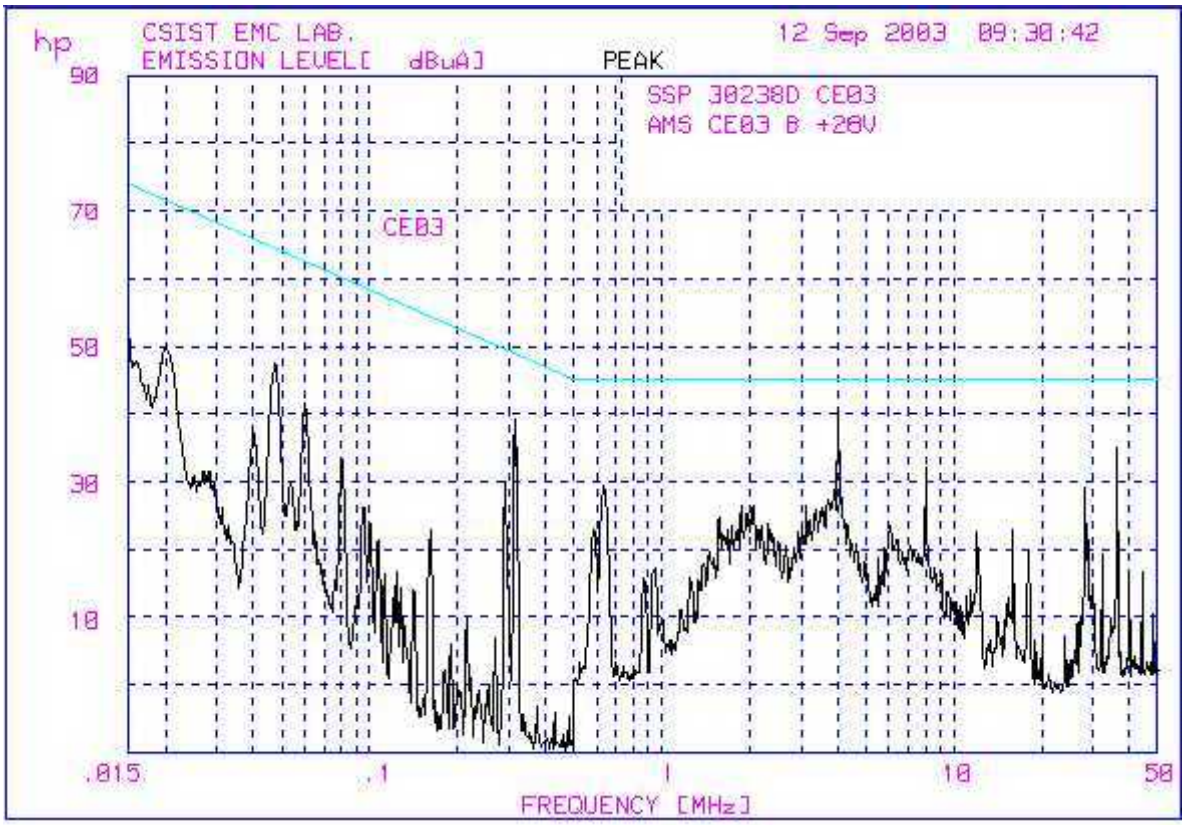
PEAK#	FREQ (MHz)	(dBuA)	DELTA
1	3.99	43.5	-1.5
2	.2984	46.6	-2.6
3	3.004	35.4	-9.6
4	.3132	38.2	-10.6
5	28.13	34	-11.0
6	8.009	32.5	-12.5

Figure 32. AMS CE03 A +28V spectrum



12 Sep 2003 09:18:36			
01. AMS SSP 30237F, 30238D			
01.02 SSP 30238D CE03			
6 highest Peaks above -80 dB of Limit Line #1			
PEAK#	FREQ (MHz)	(dBuA)	DELTA
1	3.99	44.6	-.4
2	.3132	40.7	-8.1
3	36.16	36.6	-8.4
4	1.987	33.4	-11.6
5	.6339	32.6	-12.4
6	28.13	30.2	-14.8

Figure 33. AMS CE03 B +28V Return spectrum



12 Sep 2003 09:30:42
01. AMS SSP 30237F, 30238D
01.02 SSP 30238D CE03

6 highest Peaks above -80 dB of Limit Line #1

PEAK#	FREQ (MHz)	(dBuA)	DELTA
1	4.022	41	-4.0
2	.3132	39.3	-9.5
3	36.16	35.1	-9.9
4	8.009	32.2	-12.8
5	.6339	29.3	-15.7
6	28.13	29.2	-15.8

Figure 34. AMS CE03 B +28V spectrum

8.2.3 CE07 Test Data

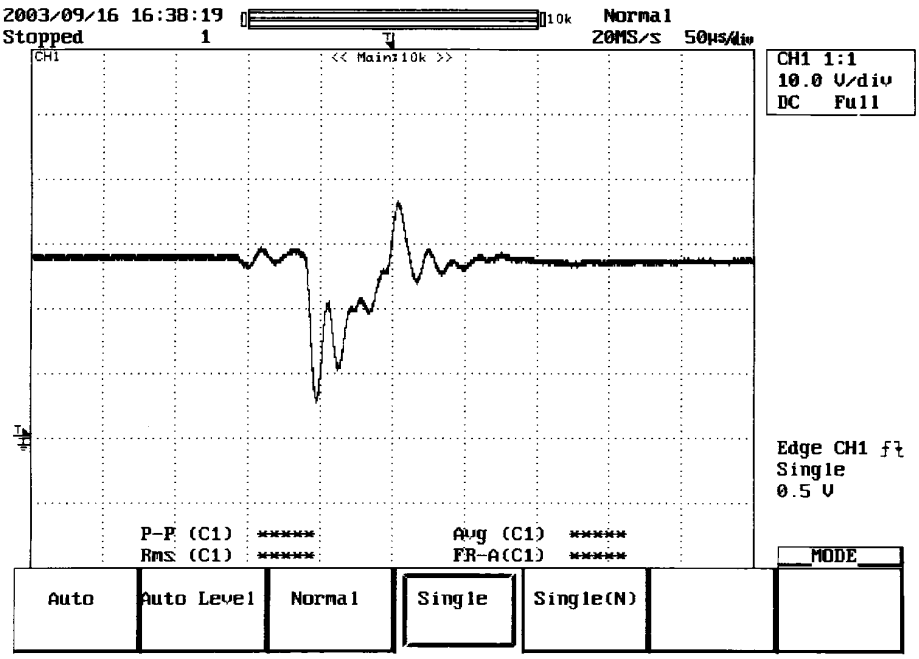


Figure 35. CE07 Test Result

8.2.4 CS01 Test Data

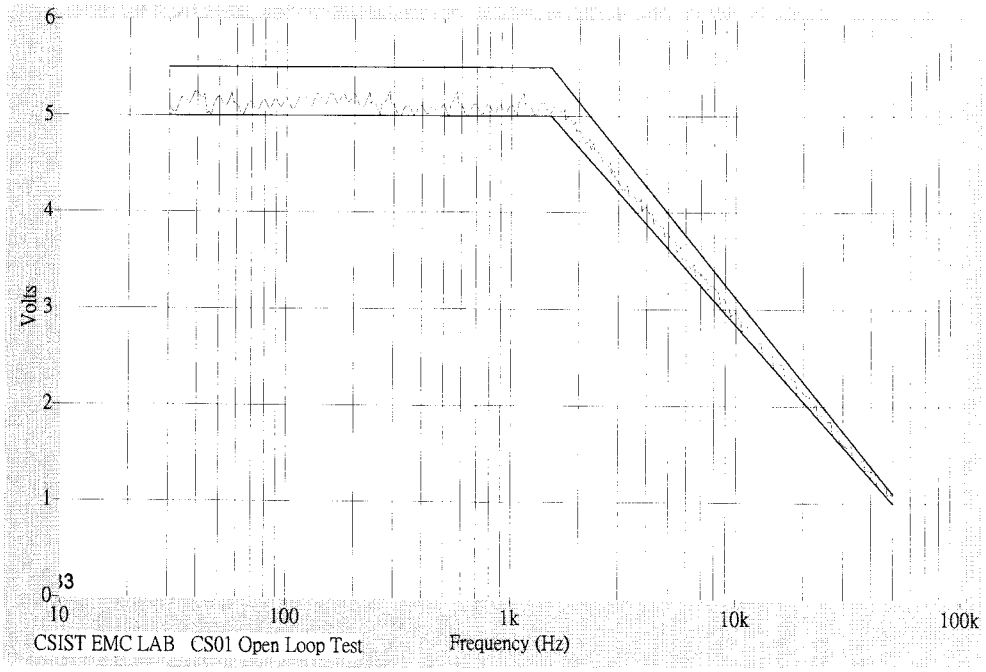


Figure 36. CS01 Test: A+28V Injected Signal Strength

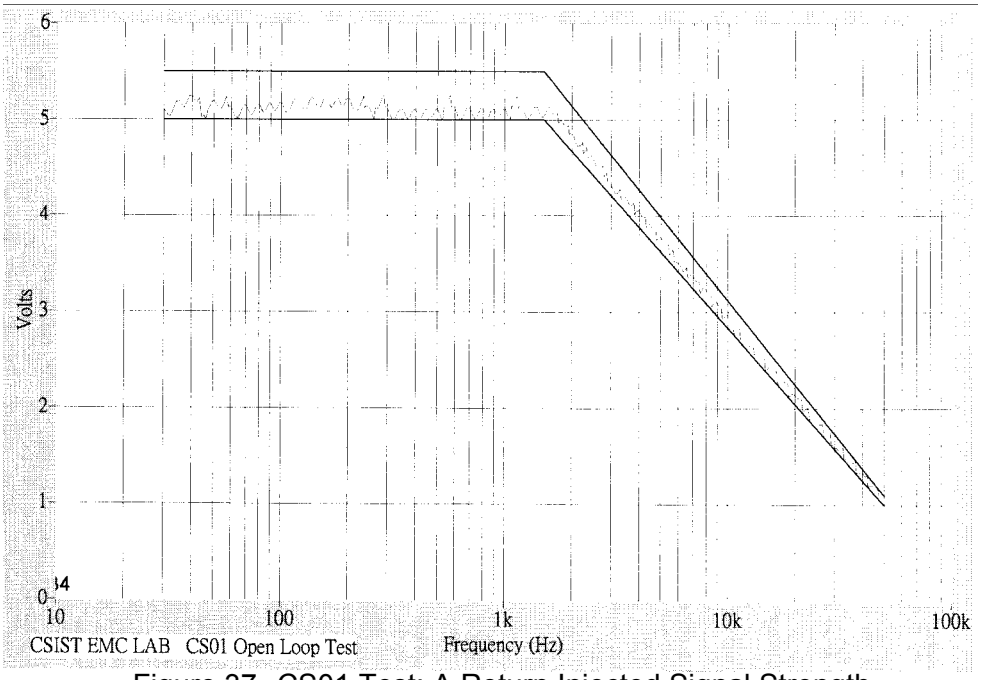


Figure 37. CS01 Test: A Return Injected Signal Strength

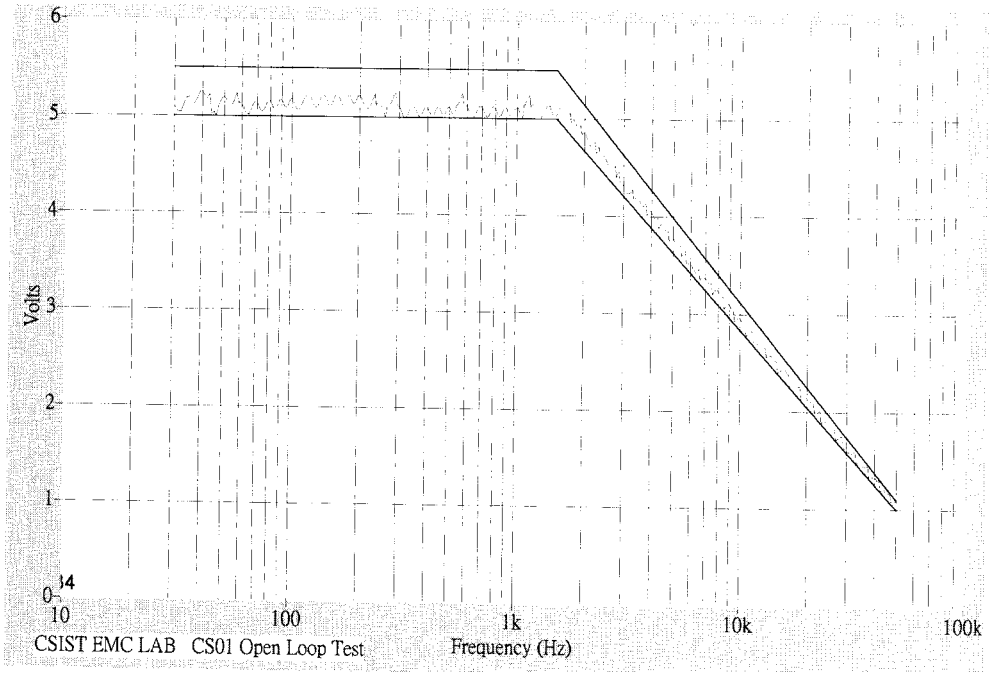


Figure 38. CS01 Test: B+28V Injected Signal Strength

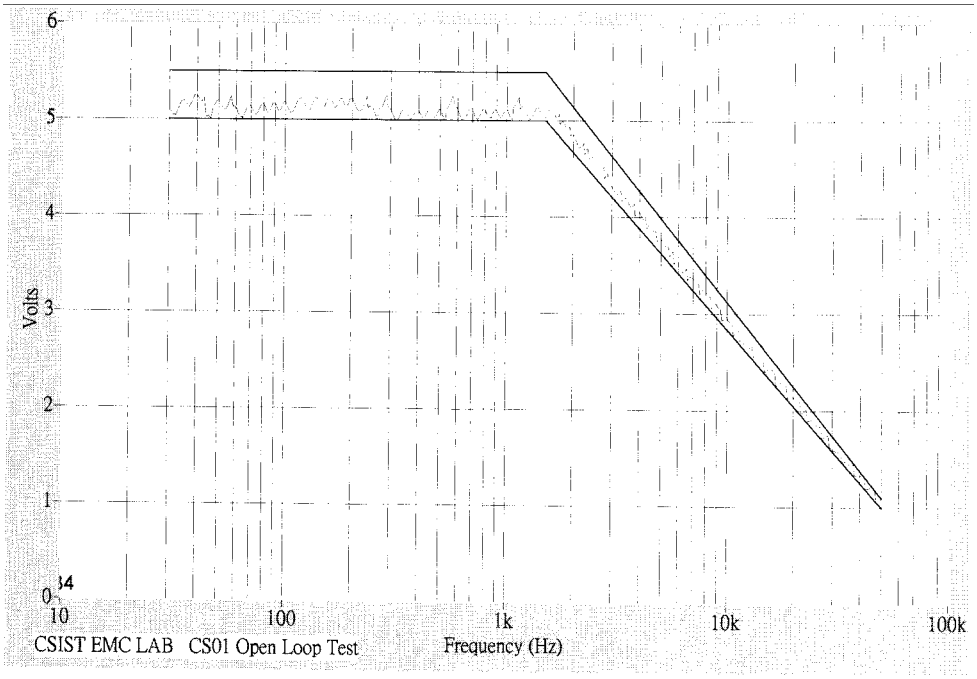


Figure 39. CS01 Test: B Return Injected Signal Strength

8.2.5 CS02 Test Data

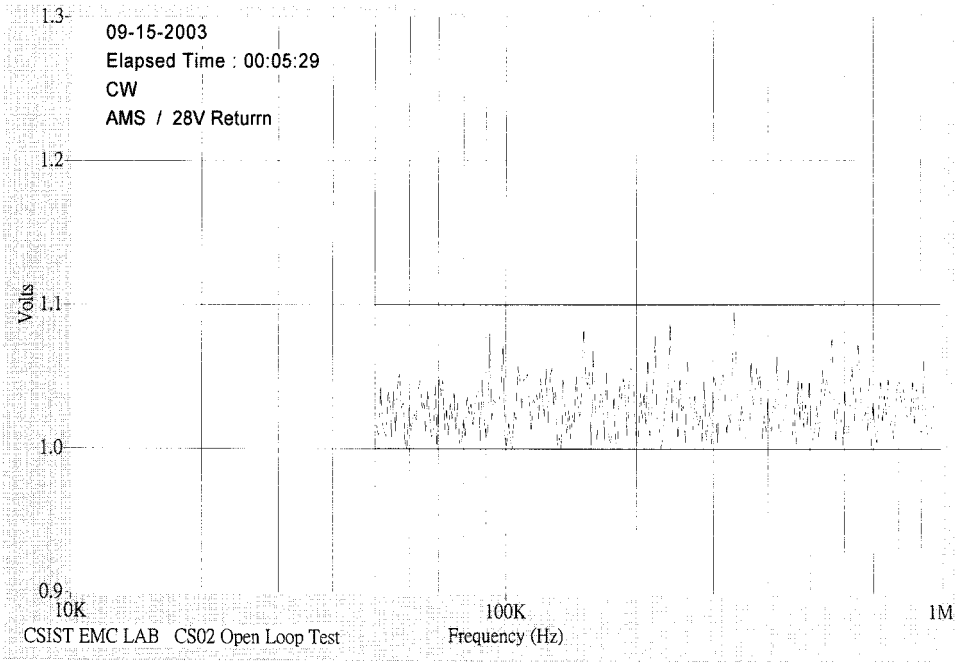


Figure 40. CS02 Test Level, 50 kHz – 1MHz, A Return

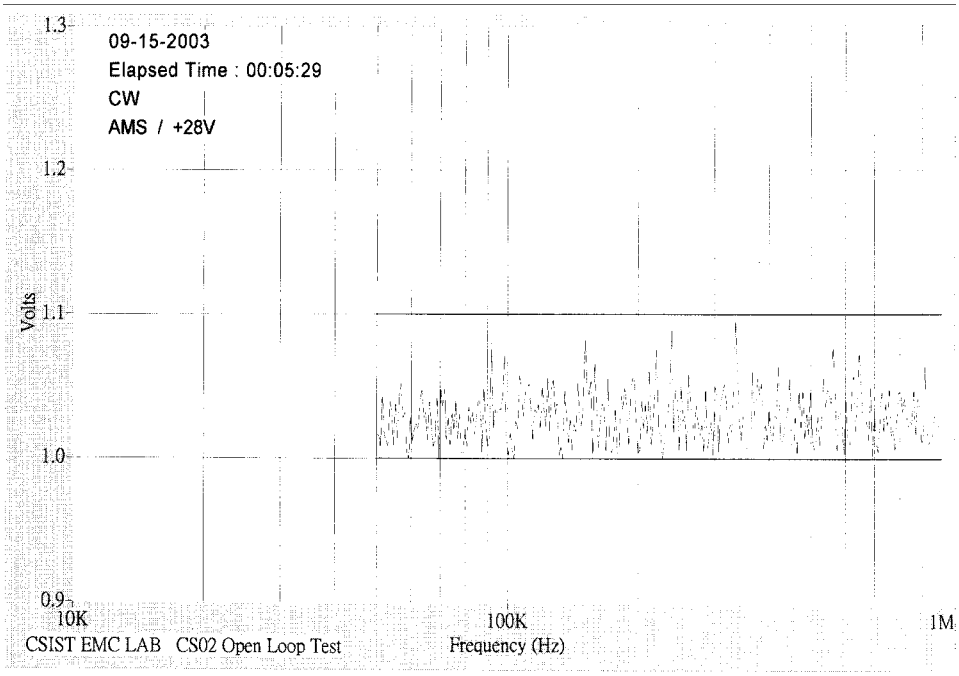


Figure 41. CS02 Test Level, 50 kHz – 1MHz, A +28V

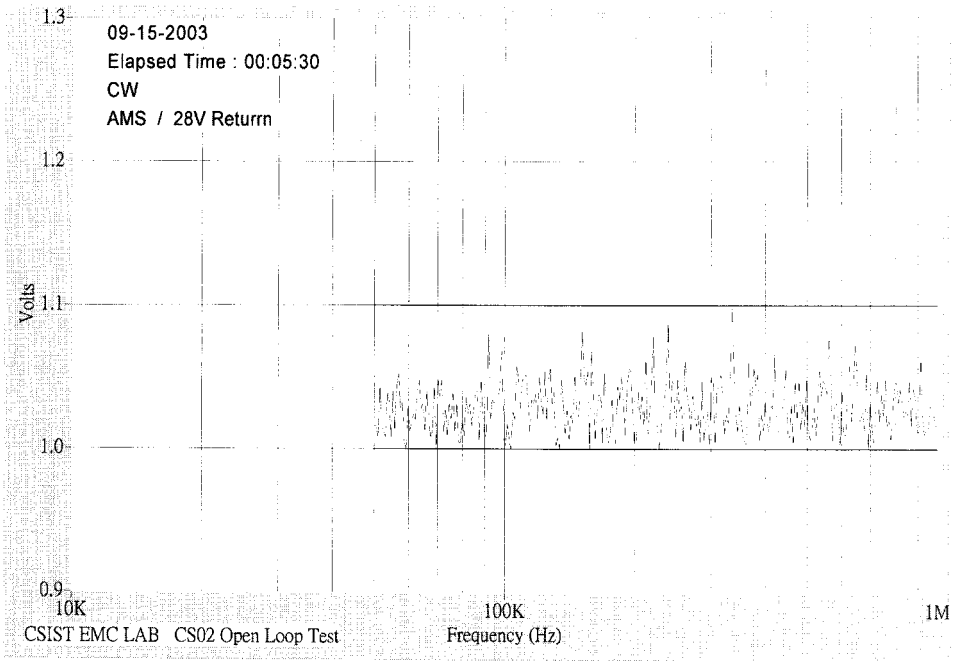


Figure 42. CS02 Test Level, 50 kHz – 1MHz, B Return

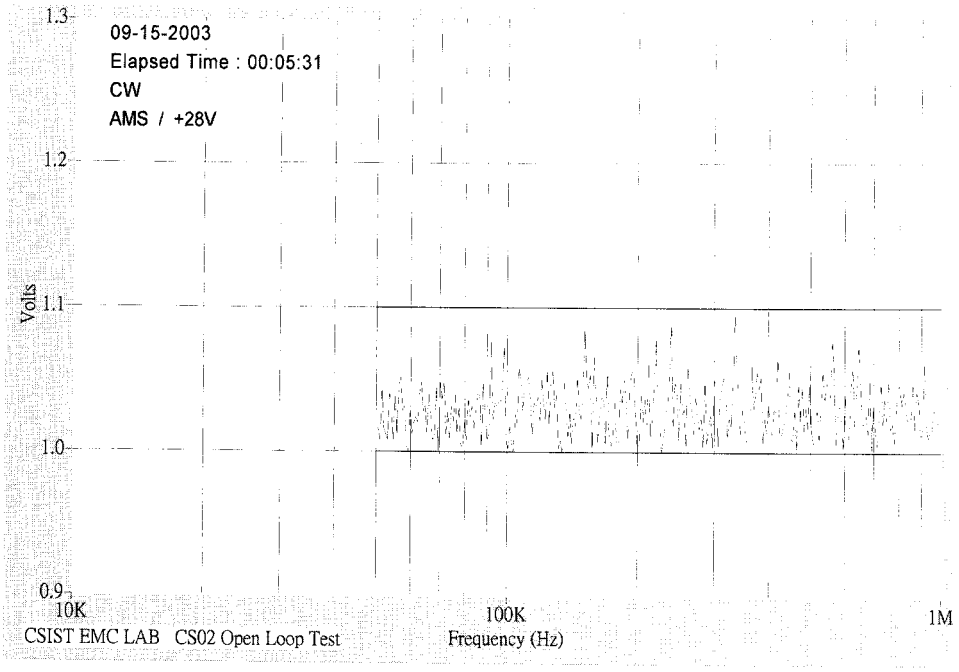


Figure 43. CS02 Test Level, 50 kHz – 1MHz, B +28V

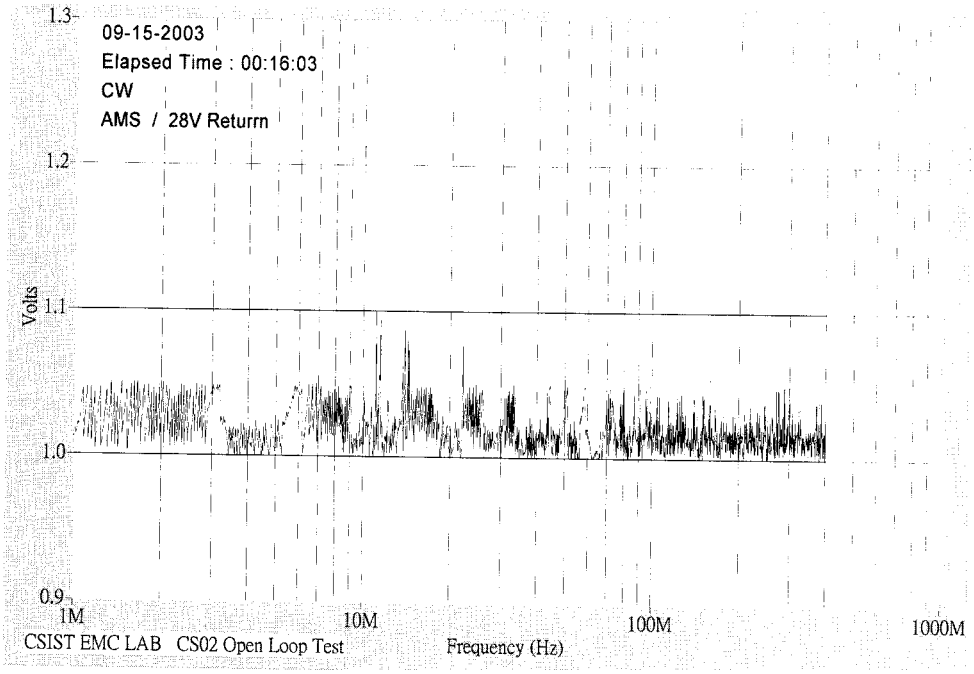


Figure 44. CS02 Test Level, 1 MHz – 400 MHz, A Return

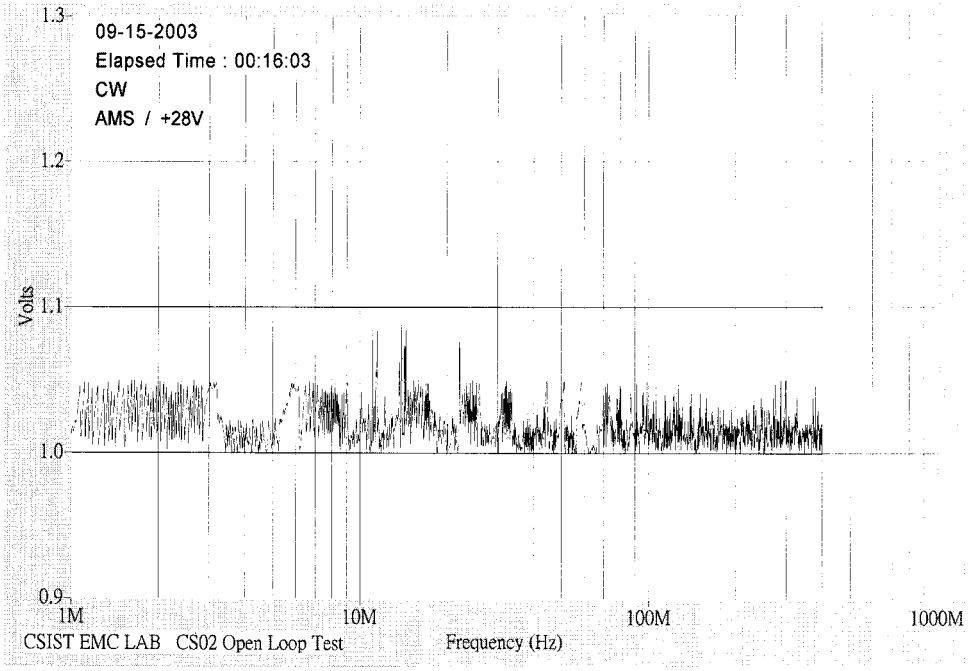


Figure 45. CS02 Test Level, 1 MHz – 400 MHz z, A +28V

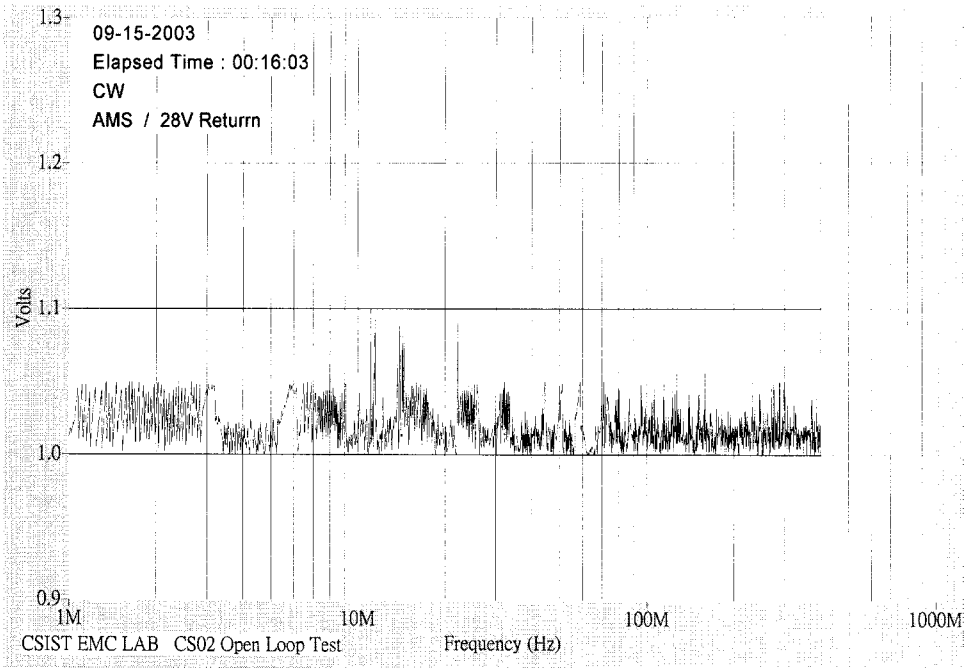


Figure 46. CS02 Test Level, 1 MHz – 400 MHz, B Return

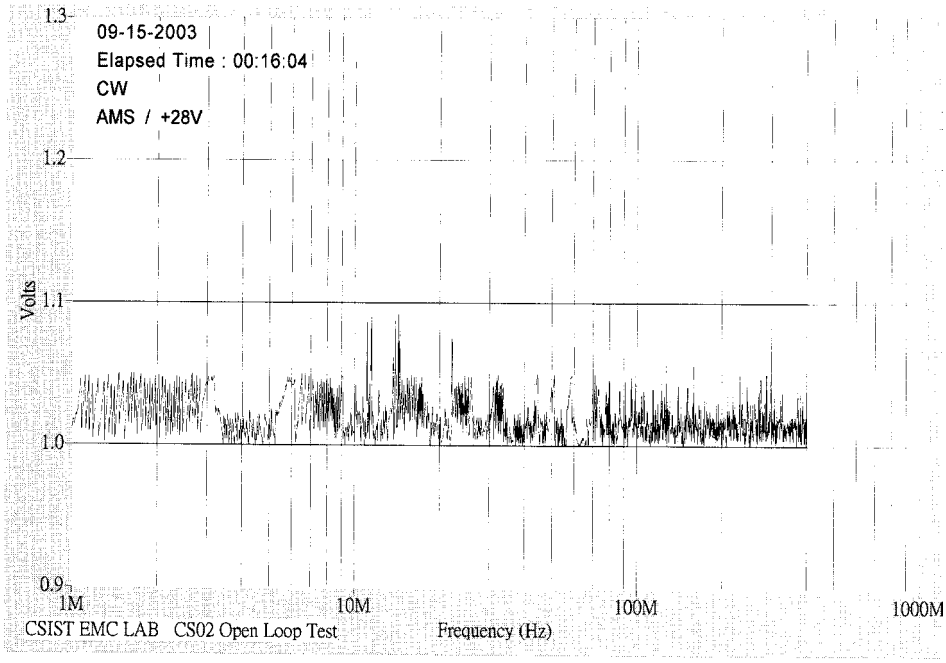


Figure 47. CS02 Test Level, 1 MHz – 400 MHz, B +28V

8.2.6 CS06 Test Data

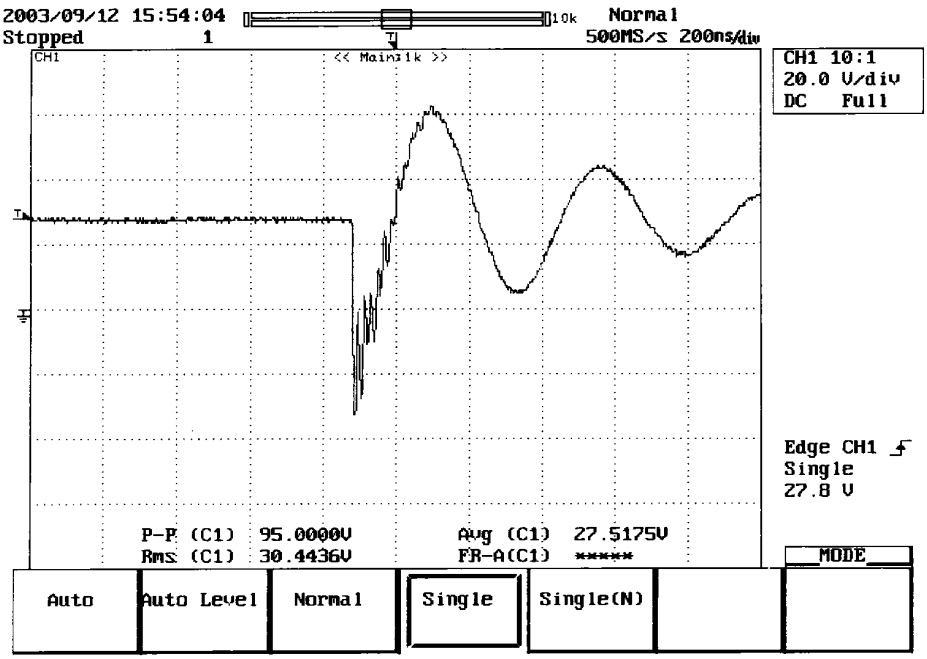


Figure 48. CS06 Transient – 0.15us

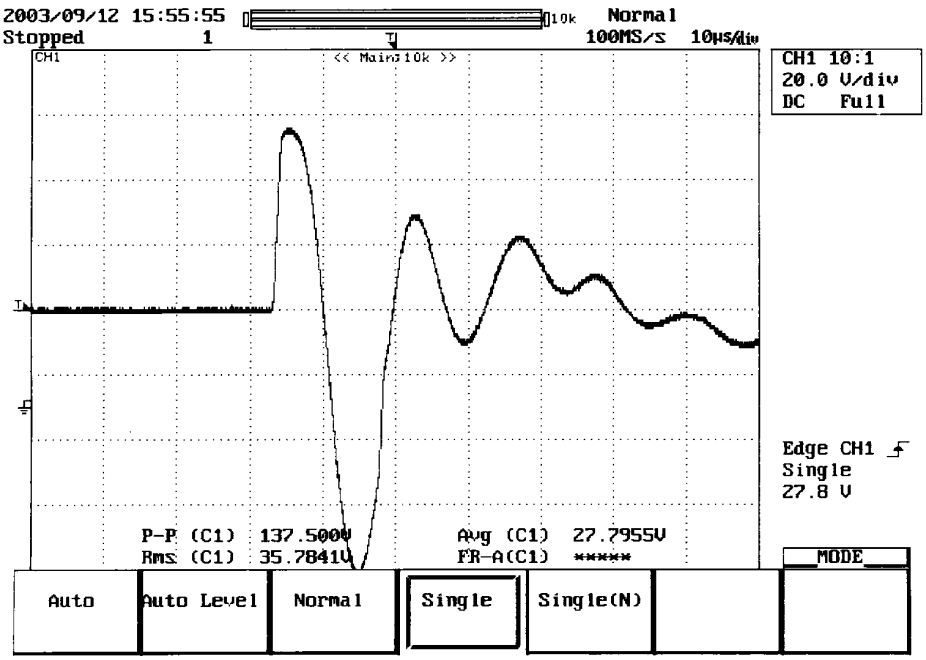


Figure 49. CS06 Transient - 10us

8.2.7 RE02 Test Data

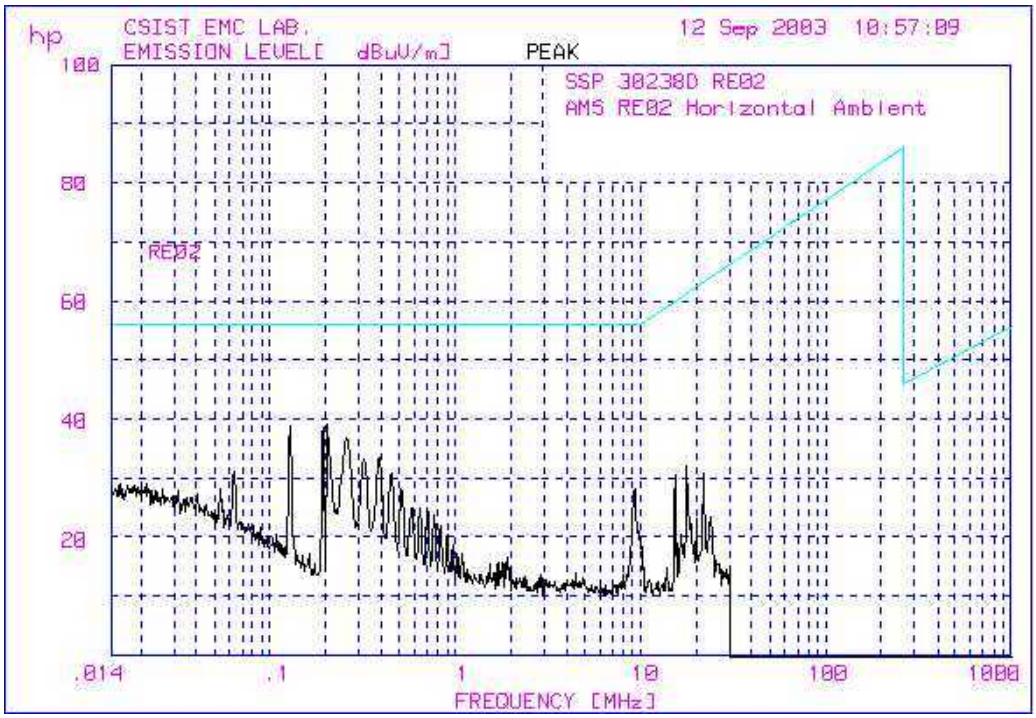


Figure 50. AMS RE02 Ambient Spectrum - ALL OFF

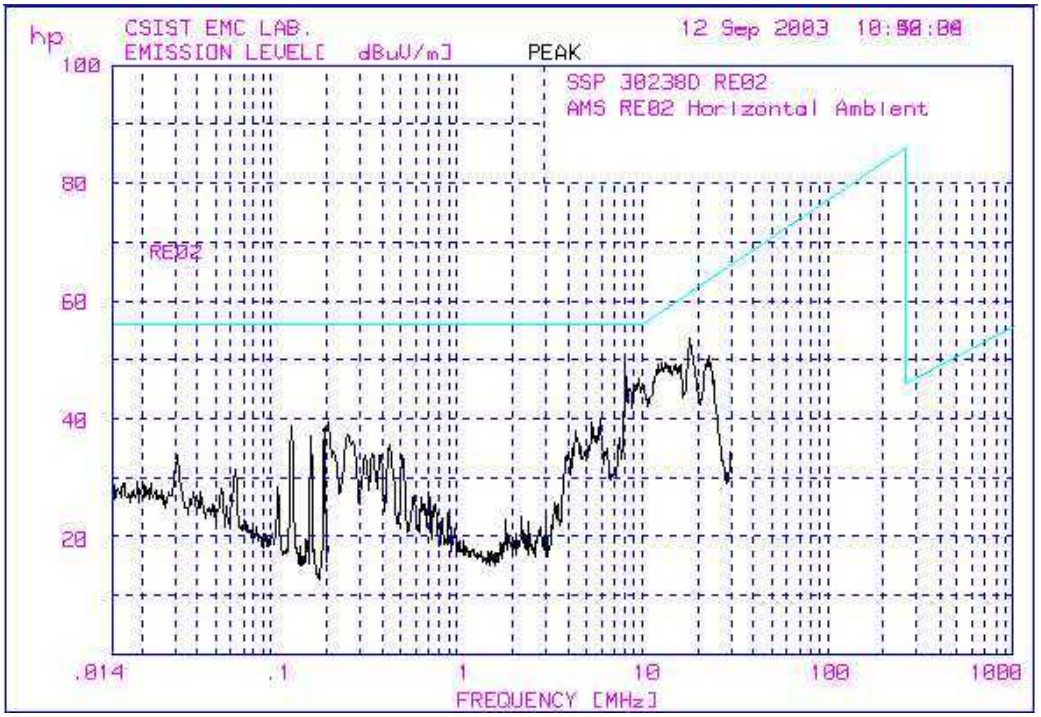
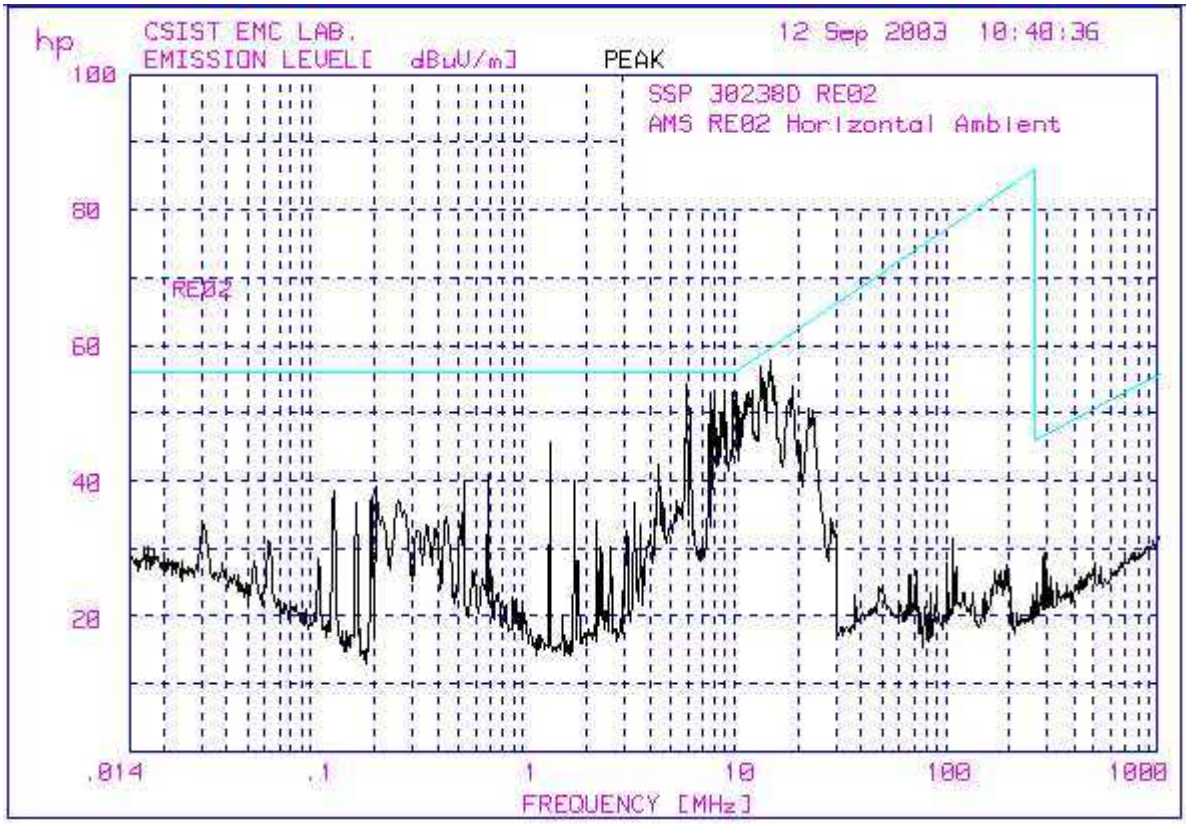


Figure 51. AMS RE02 Ambient Spectrum - EUT OFF 2xPull Signal OFF



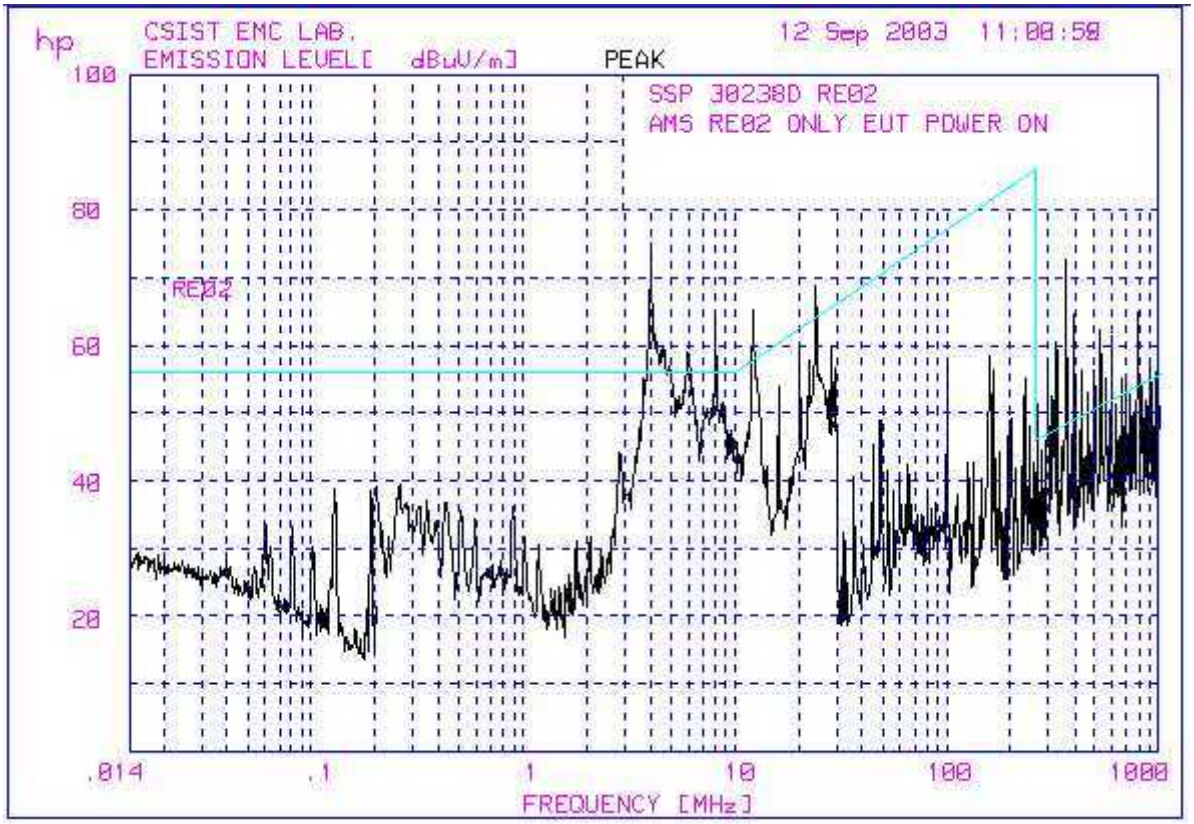
12 Sep 2003 10:40:36

01. AMS SSP 30237F, 30238D
01.03 SSP 30238D RE02

6 highest Peaks above -80 dB of Limit Line #1

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	13.29	57	-1.6
2	5.881	54.1	-1.9
3	14.86	57.7	-1.9
4	8.989	53.4	-2.6
5	7.688	53.1	-2.9
6	10.16	53.1	-3.0

Figure 52. AMS RE02 horizontal Ambient Spectrum – Only EUT OFF



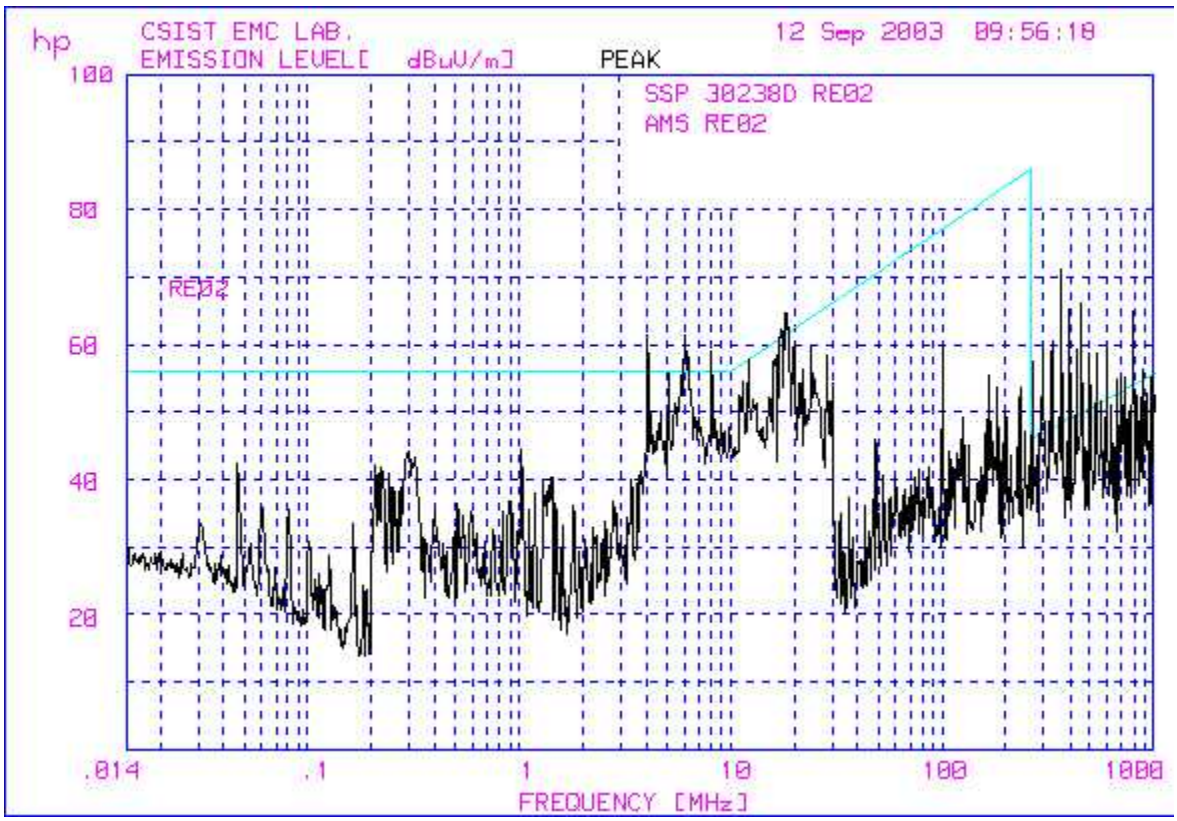
12 Sep 2003 11:03:52

01. AMS SSP 30237F, 30238D
01.03 SSP 30238D RE02

6 highest Peaks above -80 dB of Limit Line #1

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	362.03	72.7	24.4
2	3.979	74.9	18.9
3	395.85	64.6	15.6
4	327.41	60.4	12.8
5	296.11	58.2	11.3
6	523.31	62.1	11.1

Figure 53. AMS RE02 Only EUT Power ON



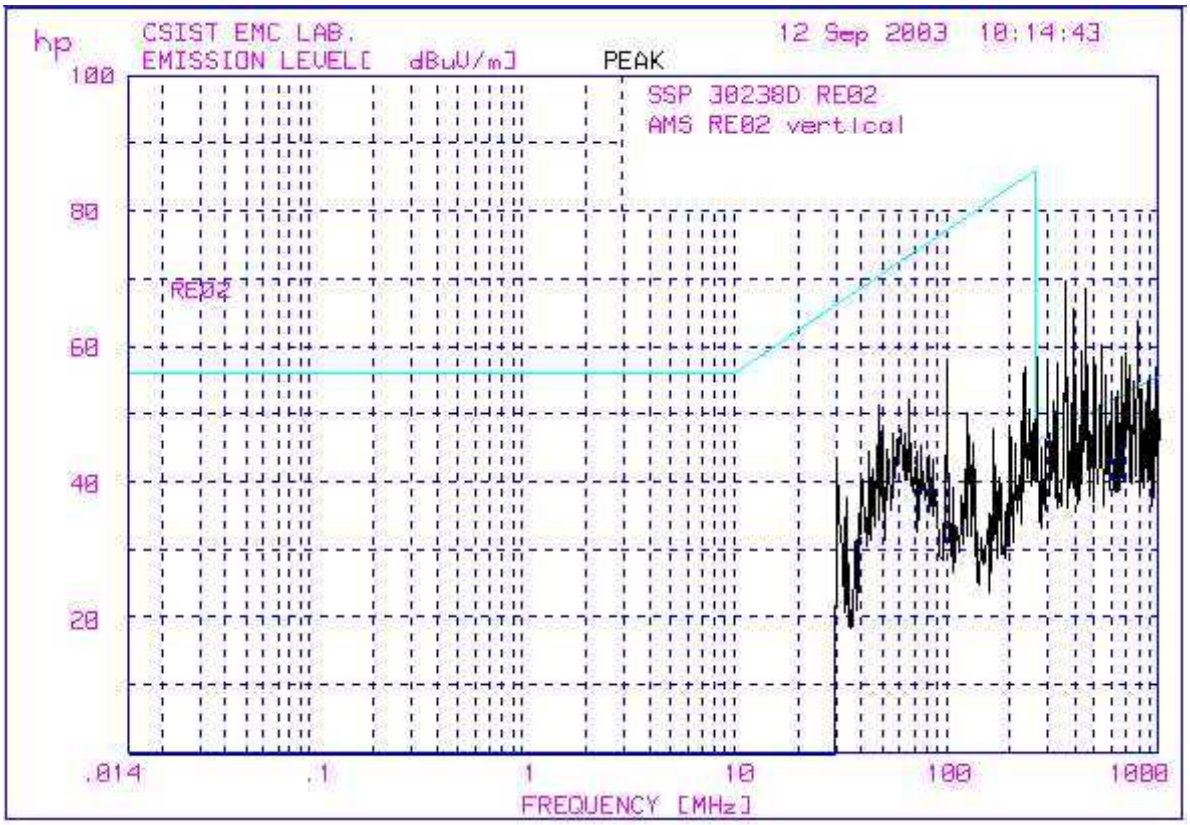
12 Sep 2003 09:56:18

01. AMS SSP 30237F, 30238D
01.03 SSP 30238D RE02

6 highest Peaks above -80 dB of Limit Line #1

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	362.03	71	22.7
2	452.61	66.2	16.3
3	395.85	65.2	16.2
4	331.09	60.6	12.9
5	296.11	59.2	12.3
6	264.83	57.6	11.5

Figure 54. AMS RE02 spectrum



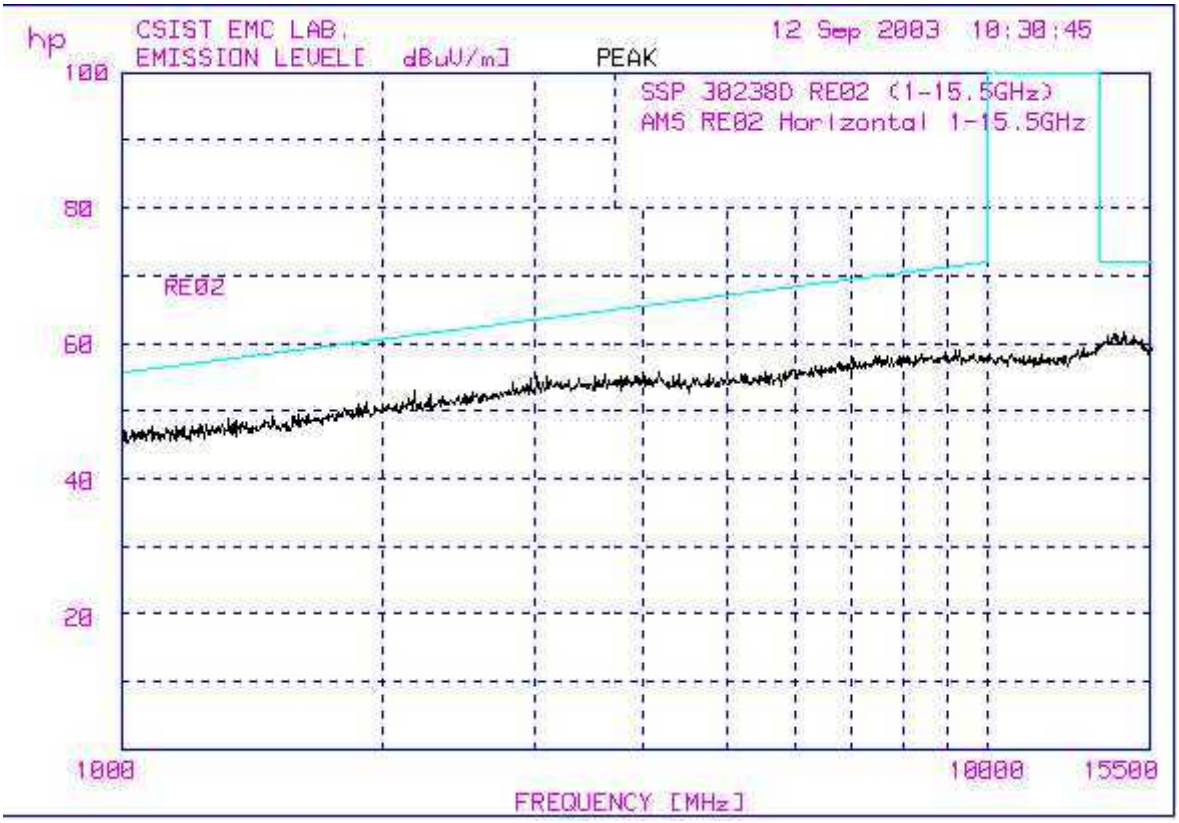
12 Sep 2003 10:14:43

01. AMS SSP 30237F, 30238D
01.03 SSP 30238D RE02

6 highest Peaks above -80 dB of Limit Line #1

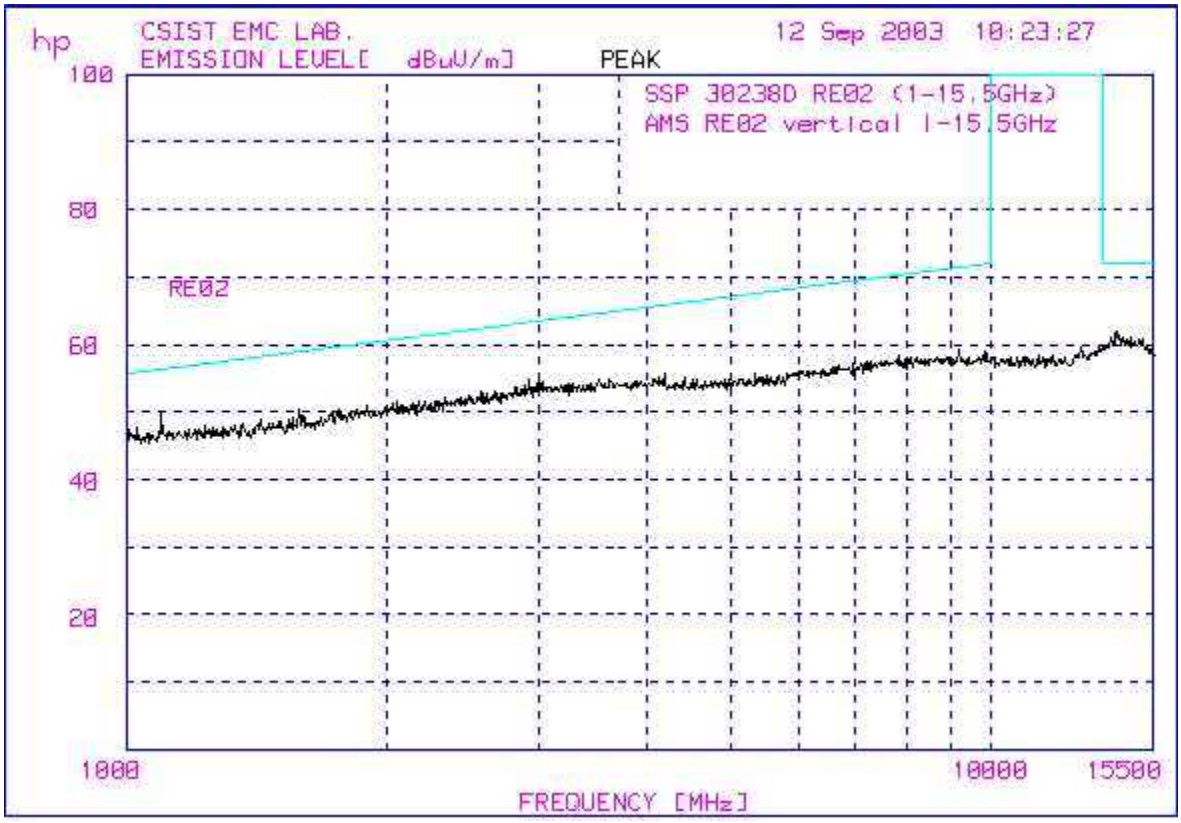
PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	362.03	69.7	21.4
2	452.61	68.5	18.6
3	395.85	65.4	16.4
4	264.83	58.4	12.3
5	296.11	56.9	10.0
6	331.09	57.6	9.9

Figure 55. AMS RE02 vertical spectrum



12 Sep 2003 10:30:45
No Peaks above -80 dB of Limit Line #1

Figure 56. AMS RE02 horizontal 1-15.5GHz Spectrum



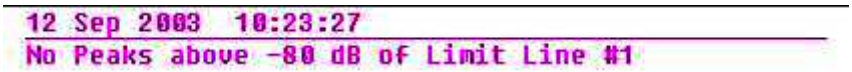


Figure 57. AMS RE02 vertical 1-15.5GHz Spectrum

8.2.8 RS02 Test Data

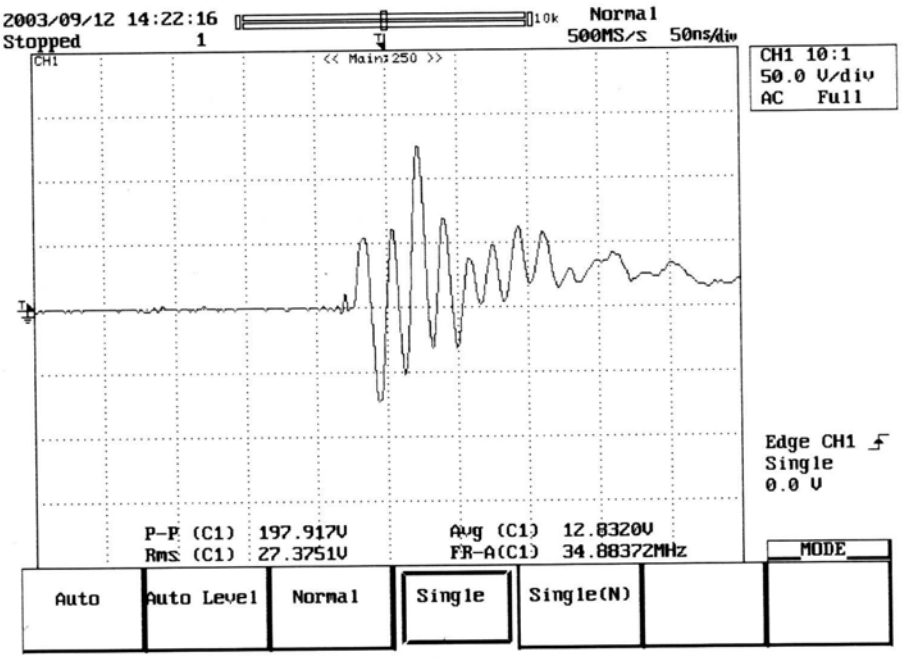


Figure 58. AMS RS02-0.15us- Positive Polarity

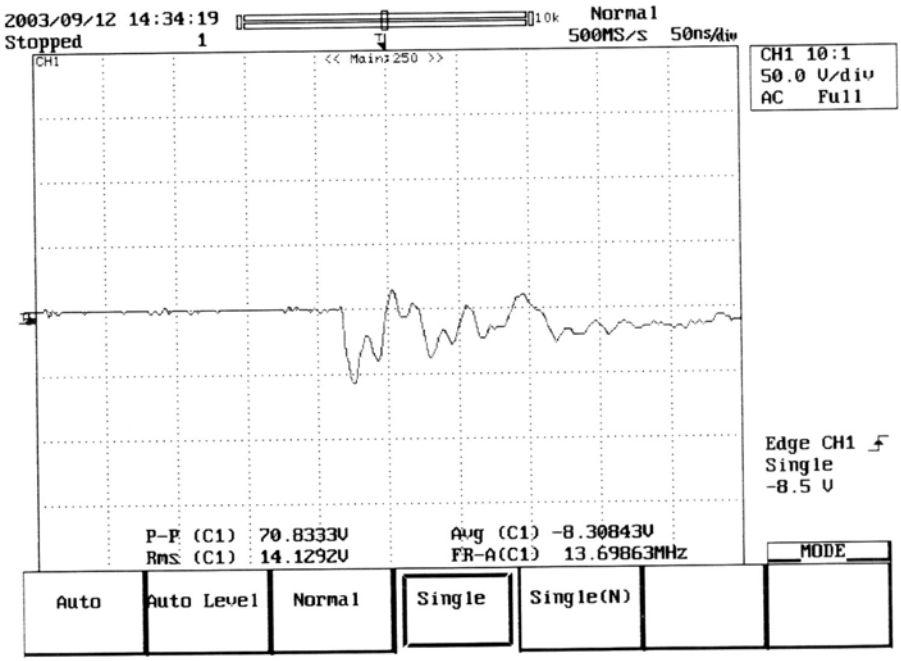


Figure 59. AMS RS02-0.15us- Negative Polarity

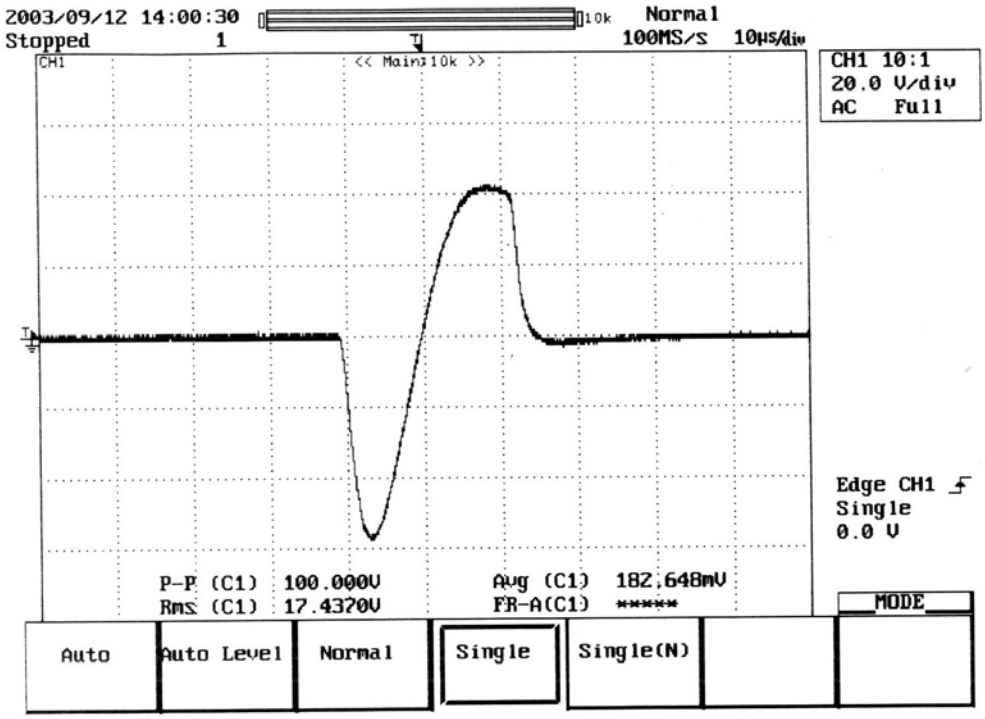


Figure 60. AMS RS02-10us-Negative Polarity

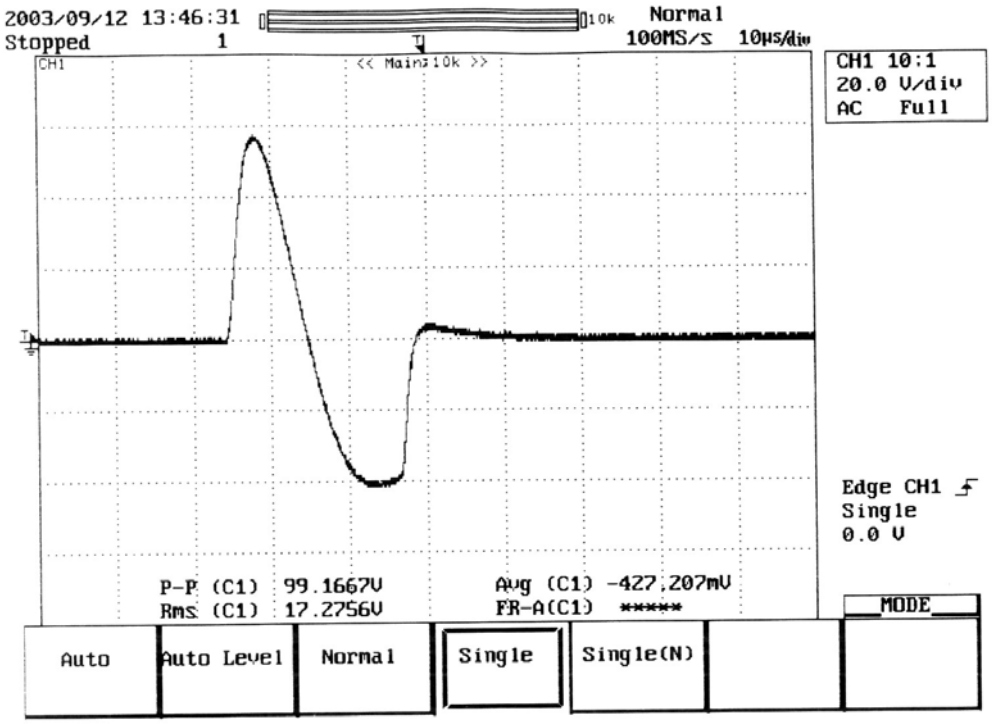


Figure 61. AMS RS02-10us- Positive Polarity

8.2.9 RS03 Test Data

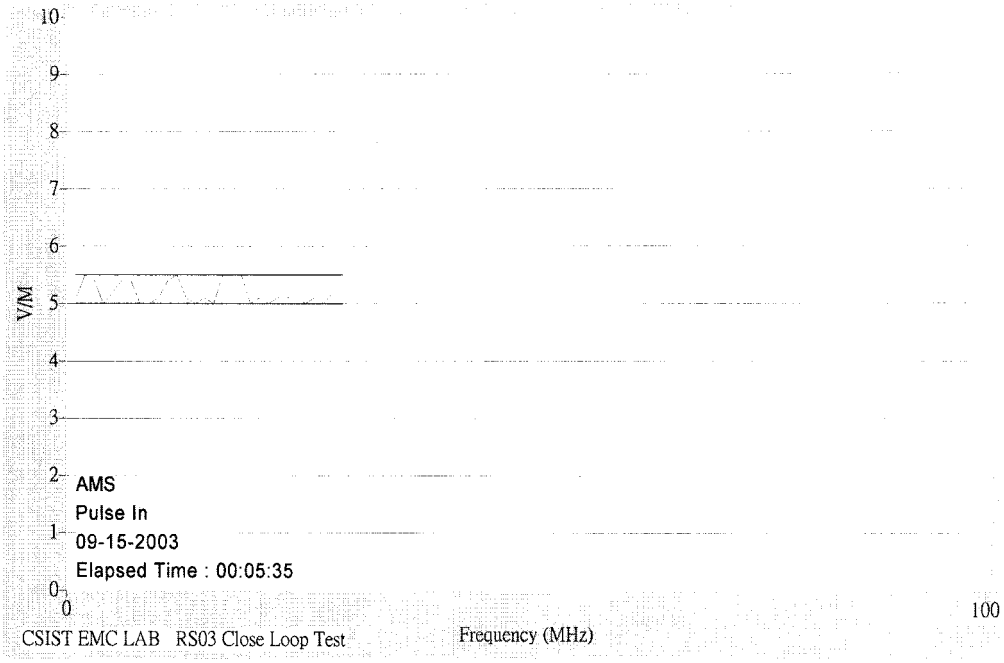


Figure 62. RS03 Test E-Field Strength: 14 kHz – 10 MHz

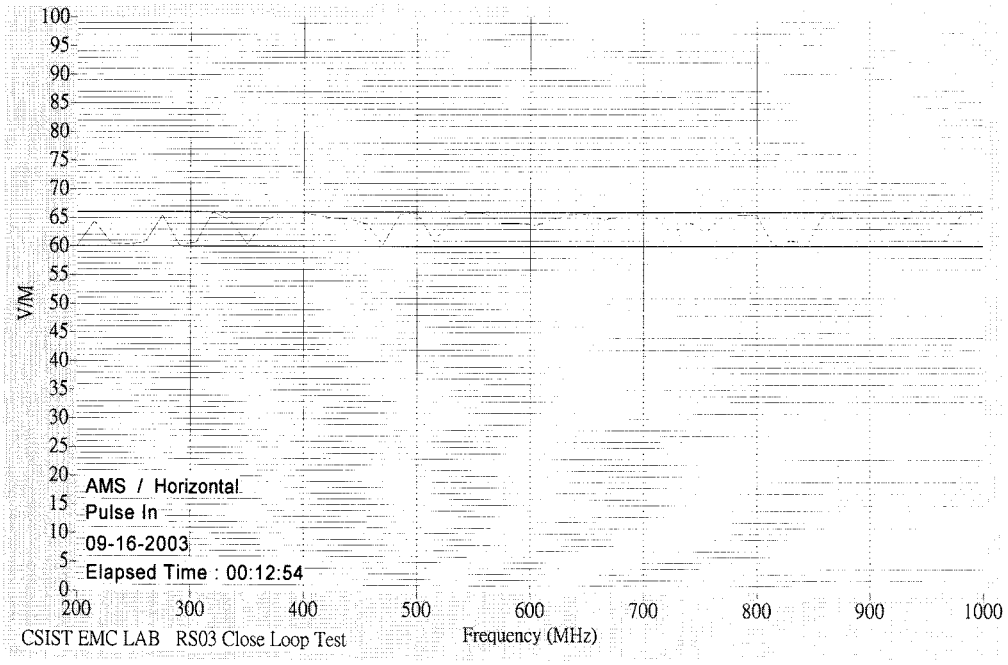


Figure 63. RS03 Test E-Field Strength: 200MHz – 1 GHz, Horizontal

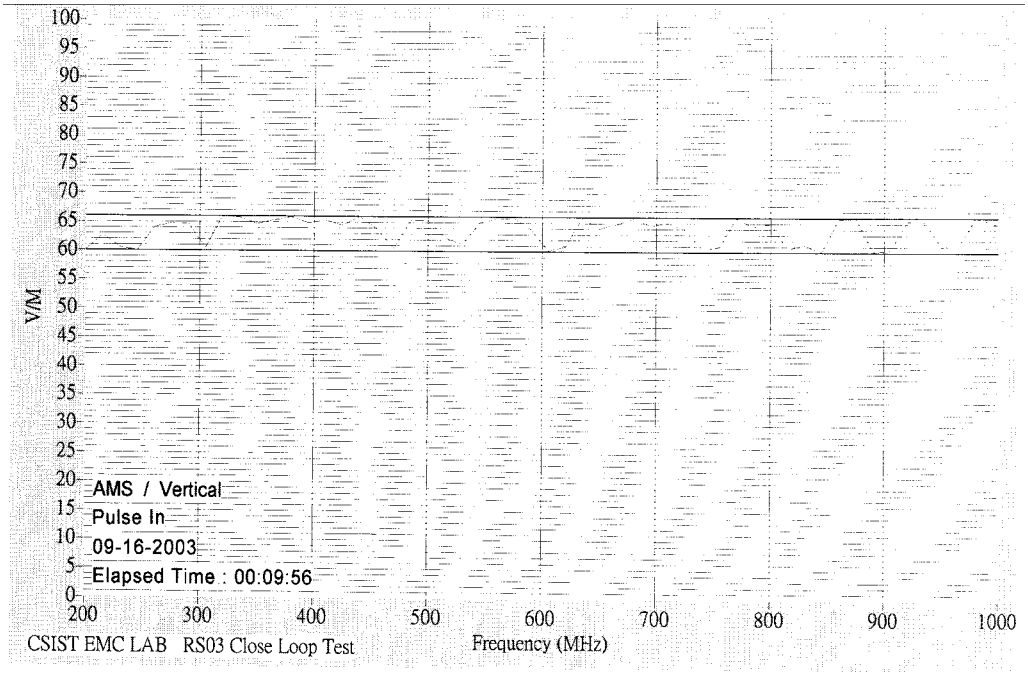


Figure 64. RS03 Test E-Field Strength: 200MHz – 1 GHz, Vertical

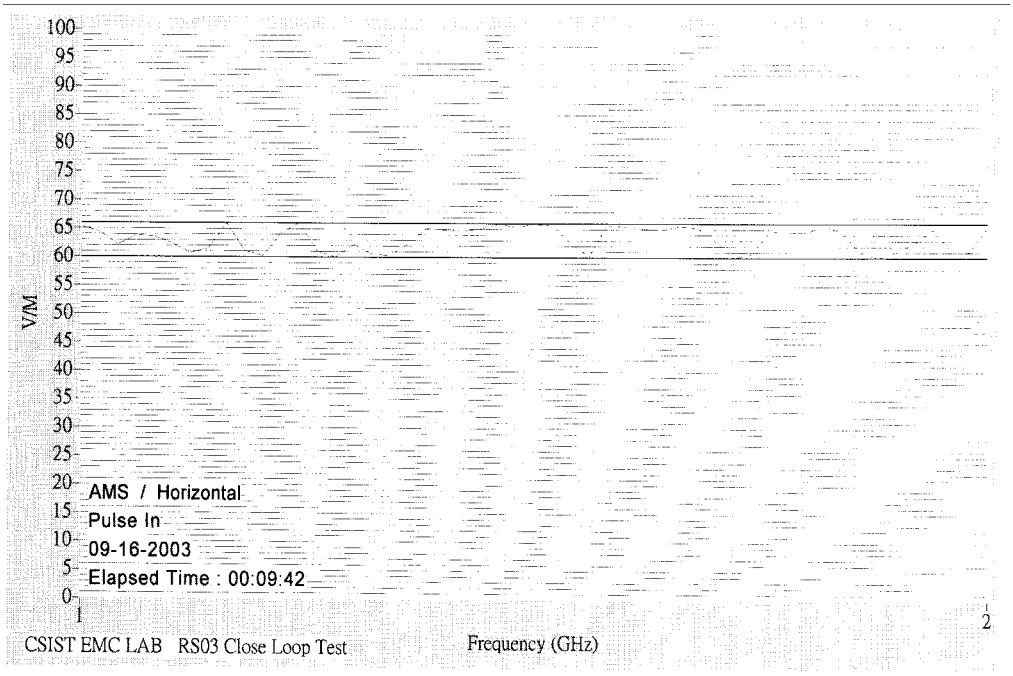


Figure 65. RS03 Test E-Field Strength: 1 – 2 GHz, Horizontal

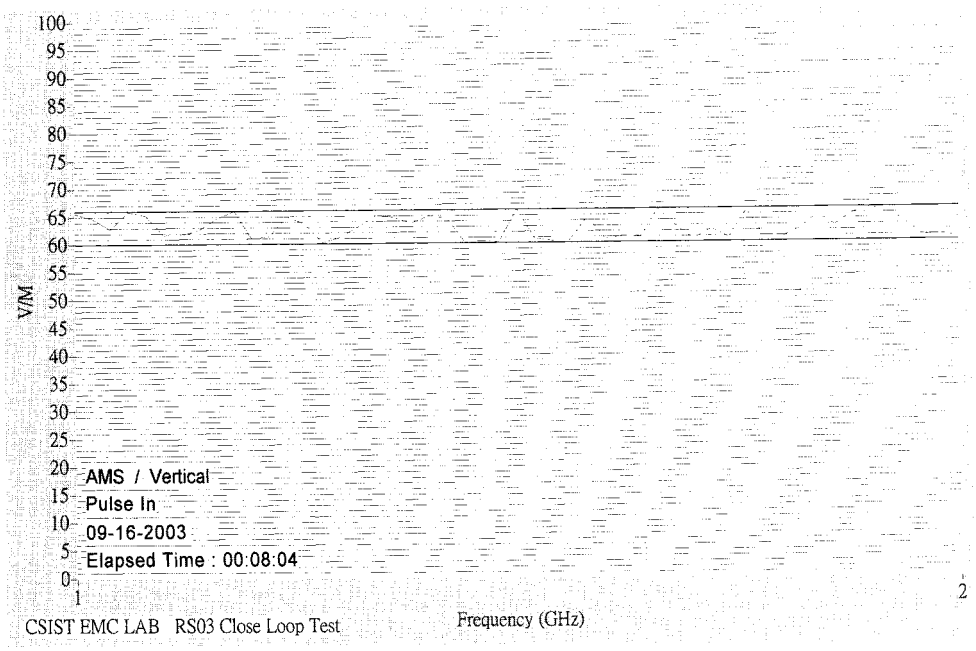


Figure 66. RS03 Test E-Field Strength: 1 – 2 GHz, Vertical

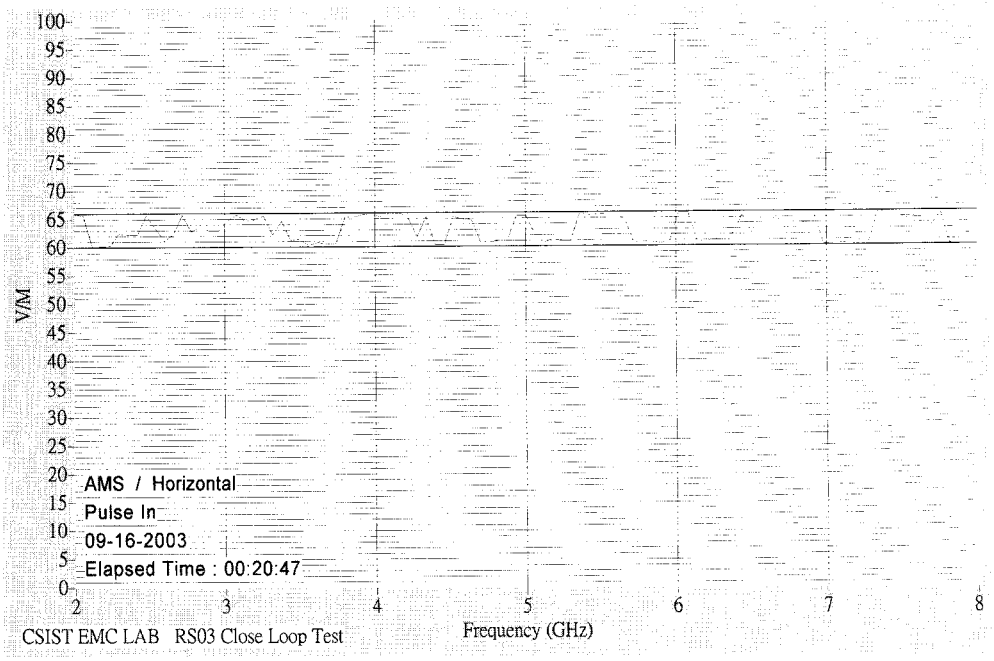


Figure 67. RS03 Test E-Field Strength: 2 - 8 GHz, Horizontal

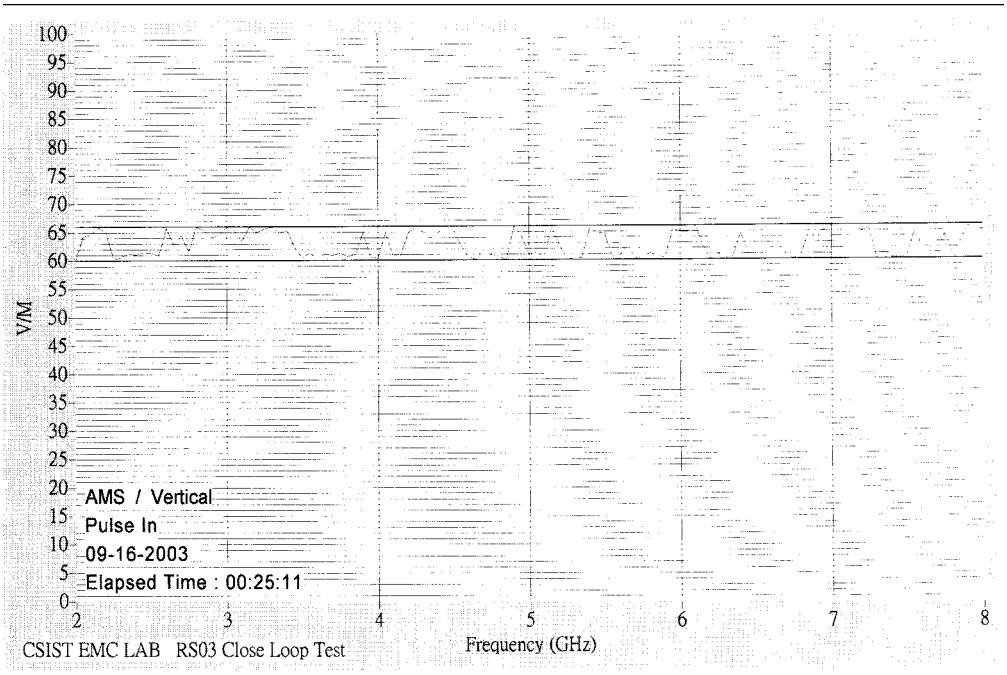


Figure 68. RS03 Test E-Field Strength: 2 – 8 GHz, Vertical

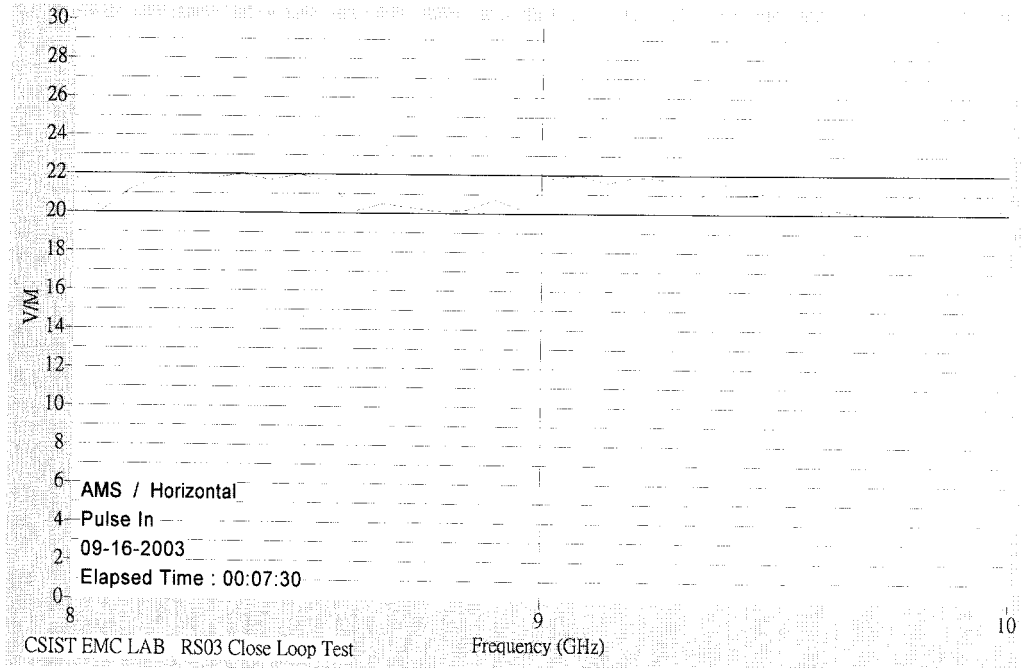


Figure 69. RS03 Test E-Field Strength: 8 - 10 GHz, Horizontal

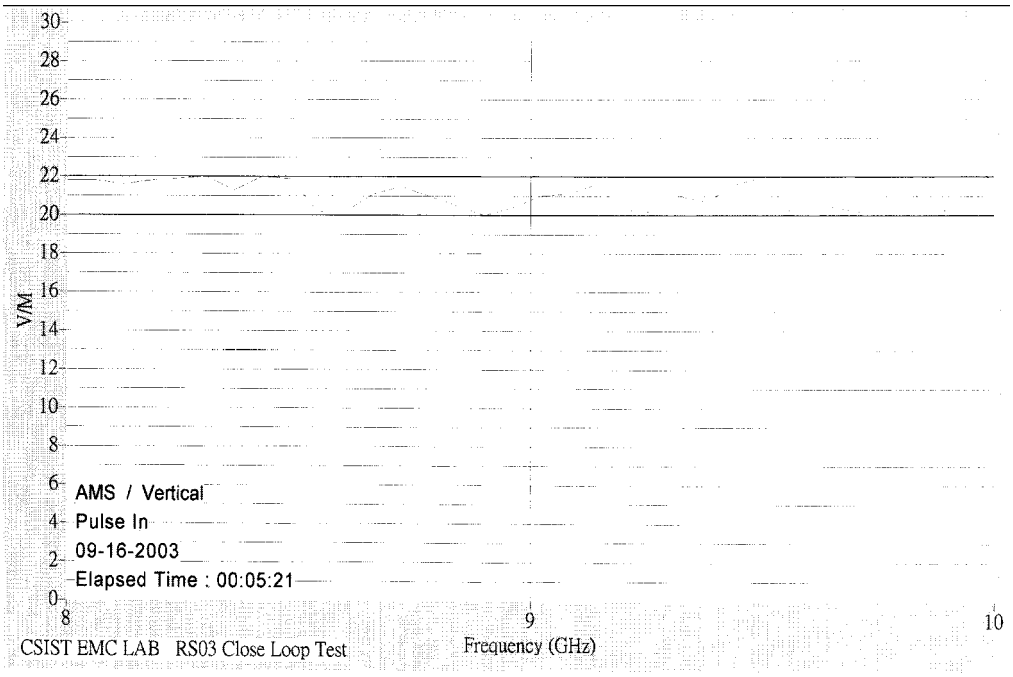


Figure 70. RS03 Test E-Field Strength: 8 – 10 GHz, Vertical

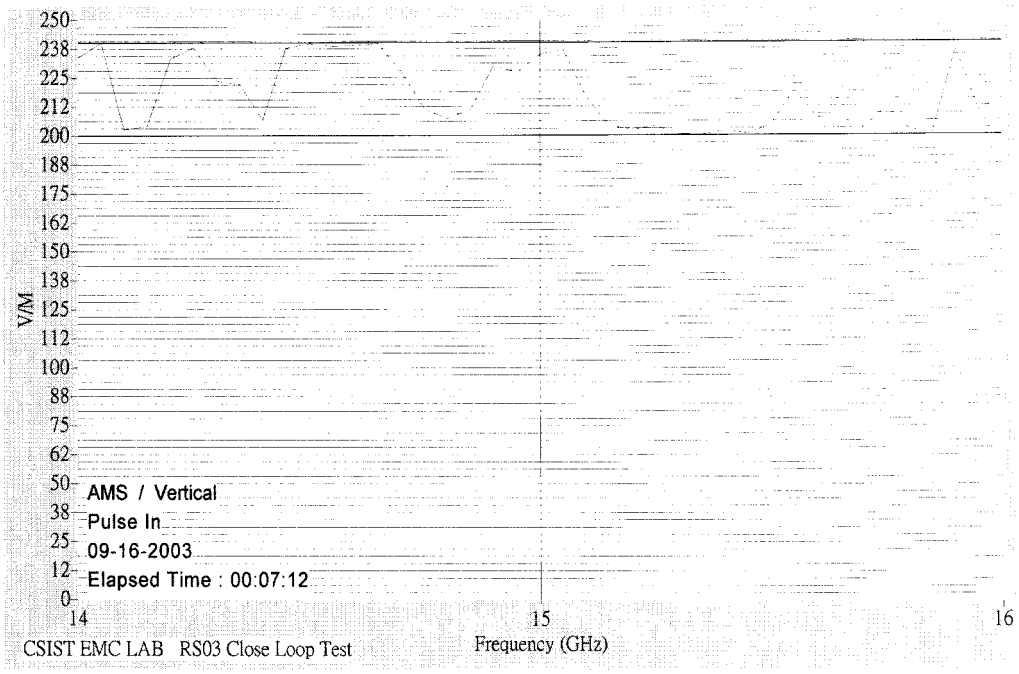


Figure 71. RS03 Test E-Field Strength: 14 - 16 GHz, Vertical

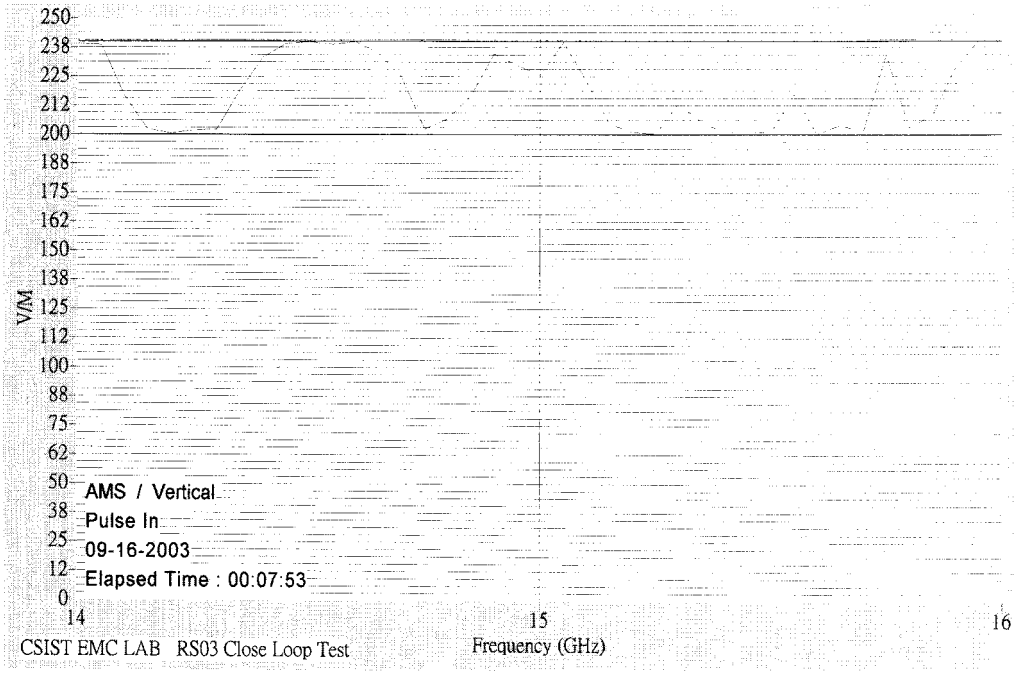


Figure 72. RS03 Test E-Field Strength: 14 - 16 GHz, Vertical